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van Spijker, B. A. J. (2012). *Reducing the Burden of Suicidal Thoughts Through Online Self-Help*. [PhD-Thesis - Research and graduation internal, Vrije Universiteit Amsterdam]. Eigen Beheer.

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Reducing the Burden of Suicidal Thoughts Through Online Self-Help

Bregje van Spijker

This thesis was prepared at the Department of Clinical Psychology, Faculty of Psychology and Education, VU University Amsterdam, within the EMGO Institute for Health and Care Research.

The randomised controlled trial conducted for this dissertation was funded by the Netherlands Organisation for Health Research and Development (ZonMw grant: 120510003).

Reducing the Burden of Suicidal Thoughts Through Online Self-Help

ISBN: 978-90-9026693-0

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Cover Design & Editing: van Gospijk.

Printing: Ipskamp Drukkers, Enschede.

VRIJE UNIVERSITEIT

Reducing the Burden of Suicidal Thoughts Through Online Self-Help

ACADEMISCH PROEFSCHRIFT

ter verkrijging van de graad Doctor aan
de Vrije Universiteit Amsterdam,
op gezag van de rector magnificus
prof.dr. L.M. Bouter,
in het openbaar te verdedigen
ten overstaan van de promotiecommissie
van de faculteit der Psychologie en Pedagogiek
op woensdag 13 juni 2012 om 15.45 uur
in de aula van de universiteit,
De Boelelaan 1105

door

Bregje Aurora Johanna van Spijker

geboren te Amsterdam

promotor: prof.dr. A.J.F.M. Kerkhof

copromotor: dr. A. van Straten

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Chapter 1

General Introduction

Rationale and aims

Suicidal people often do not receive adequate treatment. A recent worldwide survey estimated that 44% of people with suicidal thoughts in high-income countries do not receive treatment. In middle- and low income countries the percentage of untreated suicidal people is even higher (72% and 83% respectively) (Bruffaerts, et al., 2011). In general, the help-seeking process in people with suicidal thoughts is complicated. Factors that may play a role include high levels of depressive symptoms, hopelessness, shame, a preference for self-reliance (handling the problem alone), believing spontaneous recovery will occur, thinking the problem is not severe, believing that treatment will not be effective, and fear of stigma (Bruffaerts, et al., 2011; Wilson & Deane, 2010; Wilson, Deane, Marshall, & Dalley, 2010). Overall, these numbers reveal a serious unmet need for treatment among suicidal people worldwide, while receiving some form of help or support can be important in interrupting the suicidal development.

It is widely acknowledged that suicidal people benefit from anonymous and confidential support. Emotional support services such as ‘Samaritans’ have been providing this kind of support since 1953 and are nowadays contacted by a suicidal person every 57 seconds (www.samaritans.org). However, empirical evidence for the effectiveness of these services is scarce. Non-randomised studies indicate that satisfaction and perceived helpfulness are rated positively by a majority of clients. The finding that clients often call back confirms this (Krysinska & De Leo, 2007; Mishara, et al., 2007).

In line with the preceding, the Internet nowadays provides numerous opportunities for suicide prevention. These include raising public awareness of e.g. warning signs (Mandrusiak, et al., 2006; Nicholas, Oliver, Lee, & O'Brien, 2004), identifying untreated high-risk groups and encouraging them to seek help (Haas, et al., 2008), peer-to-peer support forums (Harris, McLean, & Sheffield, 2009), self-tests, and support or therapy via e-mail or chat services. A small number of integrated online suicide prevention initiatives that provide a combination of such services confirm the need for online help and support, as indicated by their user numbers (Barak, 2007; Mokkenstorm, Huisman, & Kerkhof, 2011). Reviews of empirical

studies into online suicide prevention efforts demonstrate that this is a young but promising field (Krysinska & De Leo, 2007; Pietrzak & McLaughlin, 2009).

One form of online help that does not yet exist for suicidal people, but is increasingly used for numerous other mental disorders, is self-help. Self-help can be described as a standardised psychological treatment that can be worked through independently at home. Provided online, self-help may be offered with or without therapist support. Many studies have demonstrated the effectiveness of web-based self-help for mental disorders such as depression, panic disorder, general anxiety disorder, social phobia, and problem drinking (e.g. Andersson & Cuijpers, 2009; Andrews, Cuijpers, Craske, McEnvoy, & Titov, 2010; Riper, et al., 2008). In addition to the clinical effectiveness, an increasing number of studies demonstrate that online self-help holds promise from an economic perspective as well (Gerhards, et al., 2010; Warmerdam, Smit, van Straten, Riper, & Cuijpers, 2010).

Arising from the observation that treatment in its current form does not seem to suit or reach everyone in need, this thesis presents a new alternative to suicide prevention using the Internet as a mode of delivery. Specifically, an online self-help intervention aimed at reducing suicidal thoughts was developed and studied in a randomised controlled trial. The central aims of this thesis are to investigate the clinical effectiveness, acceptability, and cost-effectiveness of this intervention.

Prevalence and burden

In the Netherlands, an average of 1,500 people die by suicide each year (Statistics Netherlands, 2010). This number is estimated to be equivalent to 43,500 years of life lost due to suicide in the Dutch population (Lanting, Toet, & Hoeymans, 2010), which places suicide in the top 24 of conditions with the greatest disease burden (de Hollander, Hoeymans, Melse, van Oers, & Polder, 2006; Hoeymans & Schoemaker, 2010). In addition, an estimated 99,600 suicide attempts occur each year (0.9% of the adult population) (Hoeymans & Schoemaker, 2010; ten Have, et al., 2006). Injuries due to suicide attempts have been estimated to result in 1,400 years lived with

disability in the Dutch population in the first year after the attempt (Lanting, et al., 2010).

The year-prevalence of suicidal thoughts in the Netherlands is 3.2% (ten Have, et al., 2006), which amounts to approximately 462,500 persons (Hoeymans & Schoemaker, 2010). No estimates have yet been made regarding the burden of suicidal thoughts, and the same applies to mental distress involved in suicide attempts. The secondary aim of this thesis therefore is to estimate disability weights for both these health states, as disability weights are essential parameters in estimating the disease burden of conditions.

Definitions

Ever since suicide and preceding thoughts and behaviours have been the subject of scientific research, many terms have passed in review to describe the suicidal continuum (e.g. suicidal ideation, suicidal wishes, suicidal plans, suicidal thoughts, suicide attempt, deliberate self-harm, self-poisoning, suicidal behaviour). Attempts have been made to define a uniform set of terms for this continuum (De Leo, Burgis, Bertolote, Kerkhof, & Bille-Brahe, 2006; Silverman, Berman, Sanddal, O'Carroll, & Joiner, 2007a, 2007b), but no consensus has yet been reached.

In this thesis, the term 'suicidal thoughts' is used to denote '*thoughts about actively ending one's life, however ambivalent these may be*'. The crucial component of this conceptualisation is thinking about initiating and performing activities to end one's life. People do not need to have positive feelings towards their suicidal thoughts in order to qualify: many people are afraid of giving in to their suicidal feelings, but they are nonetheless actively suicidal. The mere consideration of suicide as a human potentiality in itself does not qualify as suicidal thinking.

Regarding attempted suicide, two other terms are also used throughout this thesis, namely 'suicidal behaviour' and 'non-fatal suicidal behaviour'. These terms are all used to indicate "*A nonhabitual act with nonfatal outcome that the individual, expecting to, or taking the risk to die or inflict bodily harm, initiated and carried out with the purpose of bringing about wanted changes*" (De Leo, et al., 2006, p. 14).

The term ‘suicide’ used in this thesis refers to “*an act with fatal outcome, which the deceased, knowing or expecting a potentially fatal outcome, has initiated and carried out with the purpose of bringing about wanted changes*” (De Leo, et al., 2006, p. 12). Finally, the term ‘suicidality’ is utilised to indicate the continuum of suicidal behaviours, i.e. from suicidal thoughts to suicide.

Description of intervention

Background and theoretical model

Suicide prevention is an inherent part of many treatment programs in mental health care, but few interventions focus explicitly on suicidality. Most treatments primarily address depression, hoping that suicidality will recover simultaneously when the depression is adequately treated (Möller, 2009). The intervention studied in this thesis can be described as an eclectic, transdiagnostic web-based self-help program, specifically aimed at reducing suicidal thoughts. Its basis lies in evidence-based treatment programs, from which components were selected and made suitable for self-help with the help of clinical experts.

Although current empirical evidence is not conclusive, most promising treatments for suicidality include Cognitive Behaviour Therapy (CBT) (Tarrier, Taylor, & Gooding, 2008; Wenzel, Brown, & Beck, 2009), Dialectical Behaviour Therapy (DBT) (Linehan, 1993a, 1993b; Linehan, et al., 2006; van den Bosch, Koeter, Stijnen, Verheul, & van den Brink, 2005; Verheul, et al., 2003), Problem Solving Therapy (PST) (Hawton, et al., 1999; Townsend, et al., 2001), and Mindfulness Based Cognitive Therapy (MBCT) (Barnhofer, et al., 2009; Williams, Duggan, Crane, & Fennell, 2006; Williams & Swales, 2004), which are all rooted in the cognitive model. The core of this cognitive model is that “*the processing of external events or internal stimuli is biased and therefore systematically distorts the individual’s construction of his or her experiences, leading to a variety of cognitive errors*” (Beck, 2005, pp. 953-954). In other words, the way a person interprets or thinks about events or situations influences their emotional and behavioural responses to these events. Examples of common cognitive errors are

dichotomous thinking, overgeneralisation, mental filtering, and emotional reasoning. Although originally developed to explain psychological processes in depression, the cognitive model has been expanded to other mental disorders (Beck, 2005), as well as to suicidality (Wenzel & Beck, 2008).

In the cognitive model of suicidality, five empirically derived vulnerability factors are identified – impulsivity, problem-solving deficits, overgeneralised memory, cognitive distortions, and personality variables such as neuroticism and perfectionism. These vulnerability factors are assumed to play a role in activating negative schemata, i.e. negative cognitive frameworks that help organise and interpret information, or, metaphorically, “*the lens through which people view the world*” (Wenzel & Beck, 2008, p. 193) Wenzel and Beck (2008) state that there are at least two suicide-specific schemata: hopelessness (the feeling of despair that everything is wrong and nothing will turn out well), and unbearability (not being able to endure the hardships of life). Furthermore, life stress is thought to play a key role in activating these schemata. For example, a divorce for someone who has problem-solving impairments may activate a hopelessness schema, which in turn sets off cognitive processes (e.g. thinking ‘I will always be alone’ and ‘Nobody loves me’). Once triggered, cognitive processes such as attentional fixation (i.e. ‘tunnel vision’ or a preoccupation with suicide as a solution) can play a role in maintaining and worsening these schemata (Wenzel & Beck, 2008).

Following from this cognitive model for suicidality, cognitive therapy aims at changing suicide-related schemata, interrupting cognitive processes, and modifying relevant vulnerability factors. Strategies to achieve these aims include identifying negative automatic thoughts, and cognitive restructuring (Chang, Stanley, Brown, & Cunningham, 2011), which generally are incorporated in treatment programs for suicidality, the extent depending on the perspective. Below, main characteristics and viewpoints of several treatment programs for suicidality rooted in the cognitive model are summarised.

Cognitive Behaviour Therapy (CBT) is a short-term, present-oriented treatment that predominantly focuses on modifying dysfunctional thinking and behaviour. Dysfunctional thoughts in suicidal people often pertain to helplessness, hopelessness, unlovability, and worthlessness. Identification of negative automatic thoughts and cognitively restructuring these (i.e. replacing them with more adaptive ones) are

common elements of this program. With regard to treating suicidality, the development of a safety plan is also an important component (see e.g. Wenzel, et al., 2009).

Dialectical Behaviour Therapy (DBT) is an intensive treatment program developed by Linehan for treating suicidality in people meeting criteria for Borderline Personality Disorder (BPD) (Linehan, 1993a, 1993b). As suicidality is viewed as a coping strategy to decrease emotional dysregulation, teaching participants more effective coping skills is an essential element in DBT. In addition to traditional cognitive behavioural elements, DBT makes use of acceptance-based strategies to achieve this. For example, participants are taught to step back from and observe their thoughts, acknowledging them as simply passing by (see e.g. Brown, 2006; Chang, et al., 2011).

Problem Solving Therapy (PST) is an active, problem focused approach. From the problem solving perspective, suicidality is characterised by deficits in rational problem solving. Typically, the emphasis of this treatment lies in identifying specific problems and developing alternative solutions so that suicide is no longer regarded as an option. Techniques include accepting that not all problems are solvable, reducing the tendency to magnify the problems, and developing realistic goals (see e.g. Reinecke, 2006).

Mindfulness Based Cognitive Therapy (MBCT) is a relapse prevention program that combines CBT with mindfulness techniques. Its emphasis is on acceptance rather than change. Participants are taught to develop a moment-by-moment awareness, aiming towards a meta-cognitive awareness, i.e. being able to see thoughts as mental events rather than facts. Deliberately focusing awareness on everyday experiences and activities, and learning to tune in to small positive experiences are examples of elements of this program (see e.g. Williams, et al., 2006).

As noted, the core of the intervention studied in this thesis relates to the cognitive model. In line with this model, but not incorporated in the majority of the above treatment programs, except MBCT, is the perception that suicidal thinking can in some respects be similar to worry and rumination (see chapter 3). The definitions for both worry and rumination emphasise the repetitive character and the experienced uncontrollability of thoughts (Borkovec, DePree, Pruzinsky, & Robinson, 1983, p. 10;

Nolen-Hoeksema, 1991, p. 569). Although it is recognised that repetitive thinking in general can be either ‘constructive’ (e.g. in recovering from a traumatic experience) or ‘unconstructive’ (e.g. in developing and maintaining depression) (see Watkins, 2008), the latter is often true in suicidality. Moreover, the urge to stop repetitive thinking can be a motive behind a suicide attempt. The view that suicidal thinking is to some extent similar to worry and rumination provides leads for treatment. Specifically, techniques pertaining to the uncontrollability of thoughts derived from Metacognitive Therapy for worry and Generalised Anxiety Disorder (Wells, 2006), have been incorporated into the current intervention. For example, worry postponement exercises address the notion that trying *not* to think suicidal thoughts is often counterproductive.

Structure

The online self-help intervention consists of six modules, each of which can be completed in one week. Each module is structured so that participants first read a theory section that provides a background to, and a rationale for, the exercises. Next, a number of ‘core exercises’ are presented, which are considered to be essential. Participants are informed that completing the core exercises is regarded as a minimum to be able to benefit from the intervention. Finally, each module provides several ‘optional exercises’. Participants are informed that they can select those that appeal to them, as what helps may vary from person to person.

Throughout the intervention, three exemplifying vignettes are presented for demonstrational purposes when required. Also, each module contains a number of ‘Frequently Asked Questions’ that participants can consult when they have a question pertaining to any part of the intervention. If a question is not covered in the FAQ section, participants are able to submit one via the website. Answers to these questions are provided on a general level, rather than going into the specifics of participants’ personal situations. In general, no structured feedback or guidance is provided during the intervention. Finally, an automated weekly motivating email is sent to participants who have logged in at least once during the past week.

Participants who have not logged in receive one automated reminder to continue the intervention.

Content of modules

The theory section of the first module explains that suicidal thoughts can develop out of self-protection, as keeping on living may seem worse than dying. In addition, the similarities between suicidal thinking and worrying are outlined. Core exercises aim at obtaining an idea of how often suicidal thoughts are repeated, and learning to manage these repetitions better.

The theme of the second module is tolerating and regulating intense emotions. The theory explains how to recognise an upcoming crisis and taps into dealing with the urge to self-harm. Core exercises introduce different ways of coping with intense emotions, such as behavioural activation (e.g. seeking distraction), and acceptance (accepting and waiting to subside).

The third, fourth and fifth modules subsequently deal with identifying automatic thoughts, recognizing thinking patterns, and cognitively restructuring negative automatic thoughts. To facilitate this, the theory sections of these modules explain the ‘ABC model’, which states that emotions (Consequences) are caused by a person’s Beliefs about an Activating event (the trigger). Also, common distortions in thinking such as dichotomous thinking, overgeneralisation, mind reading, limited perception, and emotional thinking are discussed.

The final module is aimed at relapse prevention. In the theory section, the possibility of future setbacks, disappointments and relapse is discussed. Core exercises pertain to envisaging a realistic picture of the future, dealing with future setbacks, and recognizing and preventing relapse.

Outline of thesis

The second chapter of this thesis examines the extent of the burden of suicidal thoughts and non-fatal suicide attempts by estimating disability weights. Chapter three elaborates on theoretical similarities between suicidal thinking and worry and rumination. In the fourth chapter, an inventory of Dutch suicide-related websites is presented to observe what suicidal people may encounter when googling for suicide. Chapters five to eight report results from the conducted randomised controlled trial into online self-help for suicidal thoughts. First, the study protocol is outlined in chapter five. Next, main results regarding the clinical effectiveness at post-test are presented in chapter six, while chapter seven deals with maintenance of results at follow-up in the intervention group. In addition, outcomes of participant evaluation pertaining to perceived helpfulness, utilisation, and satisfaction of the intervention are also presented in chapter seven. Subsequently, results of cost-effectiveness analyses are provided in chapter eight. Finally, chapter nine contains a general discussion of the results and limitations of the study, as well as a reflection on online self-help for suicidal thoughts, and recommendations for future research.

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Chapter 2

Disability Weights for Suicidal Thoughts and Non-Fatal Suicide Attempts

Published as:

van Spijker, B.A.J., van Straten, A., Kerkhof, A.J.F.M., Hoeymans, N. & Smit, F. (2011). Disability Weights for Suicidal Thoughts and Non-Fatal Suicide Attempts. *Journal of Affective Disorders*, 134, 341-347.

Abstract

Background

Although there are disability weights available for a wide range of health states, these do not include suicidality. This makes it difficult to evaluate the severity of suicidality in comparison with other health states. The aim of this study therefore is to estimate disability weights for suicidal thoughts and for mental distress involved in non-fatal suicide attempts.

Methods

A Dutch expert panel of sixteen medical practitioners who were knowledgeable about suicidality estimated disability weights (DWs) for twelve health states by interpolating them on a calibrated Visual Analogue Scale. The DWs for ten of these health states had been estimated in previous studies and were used to determine the external consistency of the panel. The other two concerned health states for suicidal thoughts and non-fatal suicide attempts. The resulting DWs could vary between 0 (best imaginable health state) and 1 (worst imaginable health state).

Results

Both internal (Cronbach's $\alpha = 0.98$) and external consistency of the panel were satisfactory. The DWs for suicidal thoughts and non-fatal suicide attempts were estimated to be 0.36 and 0.46 respectively.

Limitations

The panel was relatively small, which resulted in broad confidence intervals.

Conclusions

Suicidal thoughts are considered to be as disabling as alcohol dependence and severe asthma. The mental distress involved in non-fatal suicide attempts is thought to be comparable in disability to heroin dependence and initial stage Parkinson's. These results demonstrate the severity of suicidality.

Introduction

Suicidal behaviour is a major public health problem worldwide. With approximately 1 million people dying by suicide each year it is among the leading causes of death, especially among those aged 15-44 years (Nock, et al., 2008; WHO, 2008b). In the Netherlands, around 1,500 people die by suicide each year (Statistics Netherlands, 2010). In addition, an estimated 99,600 suicide attempts occur each year (0.9% of the Dutch adult population) (Hoeymans & Schoemaker, 2010; ten Have, et al., 2006). About 14,000 (15%) of these persons attempting suicide are treated in an emergency room, of whom 9,500 are admitted to a hospital (Kerkhof, Mulder, & Draisma, 2007). Another 8,200 attempts (9%) are treated by general physicians (Marquet, Bartelds, Kerkhof, Schellevis, & van der Zee, 2005). From these figures it becomes apparent that the majority of attempts (76%) remain untreated or do not warrant medical intervention. The year-prevalence of suicidal thoughts in the Netherlands is 3.2% (ten Have, et al., 2006), which amounts to approximately 462,500 persons in a population of 16 million (Hoeymans & Schoemaker, 2010).

Suicidal thoughts and suicide attempts may occur in a number of psychiatric disorders. Psychological autopsy studies show that 90%-95% of people who die by suicide had a diagnosable psychiatric disorder at the time of the suicide (Cavanagh, Carson, Sharpe, & Lawrie, 2003). The most prevalent diseases/conditions are depression, alcohol/substance use, psychotic disorders, impulse-control disorders, and personality disorders (Nock, et al., 2008). While often perceived to be a symptom of psychiatric disorders, it has also been suggested that suicidality can be regarded as a separate syndrome or DSM-V axis (Ahrens & Linden, 1996; Oquendo, Baca-Garcia, Mann, & Giner, 2008). Core symptoms of this *suicidality syndrome* are hopelessness, ruminative thinking and social withdrawal (Ahrens & Linden, 1996).

More than mortality and prevalence alone, burden of disease has become an important indicator of a population's health. Burden of disease can be described as the impact of a health problem on the population measured by mortality and morbidity. It is most frequently quantified by Disability Adjusted Life Years (DALYs). DALYs express both the loss of healthy life years due to premature death

(Years of Life Lost, YLL) and the loss of healthy life years due to disability (Years Lived with Disability, YLD). One DALY therefore represents the loss of the equivalent of 1 year in full health. YLD for a particular health state are estimated by multiplying the incidence of a health state by the average duration of the disease and the disability weight (DW). The DW is an index between 0 (best imaginable health state) and 1 (worst imaginable health state), which expresses the severity of the disability associated with a certain health state. The DALY is described in detail in Murray and Lopez (1996).

In general, DWs are estimated using an expert panel, a patient panel or a general public panel, dependent upon the perspective of the researchers and the aim of the study. In epidemiological studies, in which DALYs are used to compare population health, expert panels are often used to estimate DWs. In cost-effectiveness studies, patient or general public panels are more often used to estimate utilities (the complement of DWs) and calculate Quality Adjusted Life Years (QALYs) (Gold, Stevenson, & Fryback, 2002). Both DALYs and QALYs have underlying assumptions which are not without controversy, and methods to estimate DWs and utilities continue to be a point of discussion (Anand & Hanson, 1997; Brazier, 2008; Mont, 2007; Murray, Salomon, & Mathers, 2000; Nord, Daniels, & Kamlet, 2009). The study described in this paper has been conducted from an epidemiological perspective and therefore focuses on DWs and DALYs, which is in line with previous studies that estimated DWs for health states (e.g. Mathers, Vos, & Stevenson, 1999; Murray & Lopez, 1996).

Disability Weights (DWs) have been estimated for many health states (Murray & Lopez, 1996; Stouthard, Essink-Bot, & Bonsel, 2000; Stouthard, et al., 1997; Vos, et al., 2001), including *self-inflicted injuries* (DW=0.447) (Mathers, et al., 1999). For burden of disease studies, self-inflicted injuries have been defined as “suicide attempts, whether or not resulting in death” (Harvard Initiative for Global Health, Institute for Health Metrics and Evaluation at the University of Washington, Johns Hopkins University, University of Queensland, & World Health Organization, 2009). In 2004, self-inflicted injuries represented 1.3% of the global burden of disease, which places them among the leading causes of disease burden worldwide (WHO, 2008a). In a recent six year follow-up study of a clinical sample of self-harm patients, Sinclair et al.

(2010) conclude that in this group “mortality, morbidity and perceived quality of life (...) were significantly worse (...) than in the general population” (Sinclair, Hawton, & Gray, 2010, p. 250).

Suicidal thoughts are not included in the definition of self-inflicted injuries, but may contribute to the overall burden of suicidality. The first aim of this study therefore is to estimate the DW for suicidal thoughts. The second aim of this study is to estimate the DW for the mental distress involved in non-fatal suicide attempts.

Methods

Valuation procedure

The valuation procedure was carried out by mail with the help of an expert panel (see *‘panel’*). Each panellist received descriptions of twelve health states (see *‘health states’*) which they were asked to interpolate on a Visual Analogue Scale (VAS), ranging from 0 (worst imaginable health state) to 100 (best imaginable health state). For the interpolation, they were instructed to consider the consequences of living with the health state for 1 year, unless otherwise specified. The VAS has been formally calibrated with 16 health states in the Dutch disability weights study using the person trade off (PTO) method (Stouthard, et al., 2000). The PTO method is the preferred method for estimating DWs for burden of disease studies since it attempts to measure social preference instead of individual preferences more directly than other methods (Nord, 1995). Since the PTO method is a relatively complex one, this study used the calibrated VAS to value health states. Panellists received the calibrated VAS and the corresponding descriptions of the 16 reference points. The original calibrated VAS has been published in Stouthard et al. (2000).

The interpolation on the VAS results in a value between 0 and 100 for each health state. Since 0 represents the worst imaginable health state and 100 the best imaginable health state, the interpolated values correspond to so-called *Utilities* on a scale from 0 to 1 (after dividing them by 100). A Utility (U) relates to a DW as $DW = 1 - U$. In the Dutch disability weight study (Stouthard, et al., 1997) utilities were

published. In order to be able to compare our DWs to the utilities from Stouthard et al., these utilities were converted to DWs.

Panel

Members of the expert panel were selected on the basis of three criteria. First, panellists had to be experienced medical practitioners. This was required because they needed to value a wide range of medical conditions. Second, a background in research was required since understanding the concept and usefulness of the DALY is important when valuing health states. Finally, panellists needed to be knowledgeable about suicidality. Panellists were recruited through personal networks of the authors.

In total, 26 experts were invited to participate. Six of them indicated they were unable to take part in the study (mostly due to lack of time), and two could not be reached. The remaining 18 received the set of necessary documents. The sixteen experts who returned the set formed the final panel.

Health states

Ten health states for which DWs had been previously established were selected for this study in order to compare our panel to previously used panels. These health states needed to represent a broad range of DWs, include both acute and chronic diseases, and take both physical and psychiatric disorders into account. The selected health states were: meningitis with permanent locomotor impairment (DW=0.17), meningitis with permanent locomotor and cognitive impairment (DW=0.76), constitutional eczema (DW=0.07), moderate rheumatoid arthritis (DW=0.37), moderate heart failure (DW=0.35), severe heart failure (DW=0.65) (Stouthard, et al., 2000), severe depression with psychotic features (DW=0.84), moderate to severe depression (DW=0.51) (Kruijsaar, Hoeymans, Spijker, Stouthard, & Essink-Bot, 2005), cataract (DW=0.11) and macular degeneration (DW=0.25) (De Hollander, et al., 2006).

Each health state consisted of a descriptive text based on criteria from the *International Classification of Diseases 10th revision (ICD-10)* (WHO, 2007) and the

Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) (American Psychiatric Association, 2000). In addition, a standardised health classification derived from the EuroQol 5D+C5L (Janssen, Birnie, & Bonsel, 2008; Janssen, Birnie, Haagsma, & Bonsel, 2008; Krabbe, Stouthard, Essink-Bot, & Bonsel, 1999) was added to the description. This rates the condition on six dimensions (mobility, self-care, usual activities, pain/discomfort, anxiety/depression and cognition) on a five-level scale (no problems to severe problems).

For suicidal thoughts and non-fatal suicide attempt (see De Leo, et al., 2006 for the definitions), no *DSM-IV-TR* or *ICD-10* criteria were available. The authors therefore composed these textual descriptions. The EuroQol descriptions of these health states were based on data from the Netherlands Mental Health Survey and Incidence Study (NEMESIS) (ten Have, et al., 2006). The eight scales of the Short Form-36 health survey (SF-36) (Ware, Snow, Kosinski, & Gandek, 1993) and two additional questions were used to indicate disability. These two additional questions were about the number of days spent in bed due to psychiatric problems, drug-related problems or alcohol-related problems, and the number of days being unable to work due to any of these problems. A formal algorithm (available from the authors on request) was used to transform the SF-36 data into EuroQol 5D+C5L classifications (Kruijshaar, et al., 2005). Boxes 1 and 2 provide the full descriptions of suicidal thoughts and non-fatal suicide attempt.

Statistical Analyses

Before calculating the mean DWs for suicidal thoughts and non-fatal suicide attempts we had to ascertain the reliability of the panel. First, the internal consistency of the panel was determined (a) by calculating Cronbach's alpha and (b) by calculating Pearson correlation coefficients and paired sample t-tests in which each panellist was compared with the mean of the other panellists in order to identify possible outliers (i.e. panellists who valued health states systematically different from the mean of the panel).

Second, the external consistency of the panel was determined by using ten health states for which DWs had previously been estimated (see '*health states*'). These

DWs were compared to the DWs of our panel using Pearson correlation coefficients and paired sample t-tests. In addition, a graph was constructed to visually inspect potential differences. Analyses were performed using SPSS 16.0.

Box 1. Health state description suicidal thoughts

Suicidality
Suicidality is divided into the following stages: <ol style="list-style-type: none">1. Suicidal thoughts2. Non-fatal suicide attempt
We now ask you to value: People with suicidal thoughts
These people experience one or more periods of suicidal thoughts within a year. During these periods they think about death and ask themselves if they would be better off dead. They possibly make a concrete plan, but they do not attempt suicide. The majority have a psychiatric condition; a minority receive treatment.
In a year, their condition is characterised by*:
<div>No problems in walking about</div> <div>No problems with self-care</div> <div>•• Some problems with performing daily activities (<i>e.g. work, study, housework, family or leisure activities</i>)</div> <div>•• Moderate pain or discomfort (<i>fatigue</i>)</div> <div>•• Moderate anxiety or depression</div> <div>• Few cognitive impairments (<i>with memory, concentration, disorganisation, IQ level</i>)</div>

Box 2. Health state description attempted suicide

Suicidality
Suicidality is divided into the following stages: <ol style="list-style-type: none">1. Suicidal thoughts2. Non-fatal suicide attempt
We now ask you to value: People who attempted suicide
These people attempted suicide one or more times within a year, without a fatal outcome. The majority made a concrete plan prior to the attempt. Almost half do not have the intention to die; for them the attempt was a 'cry for help'. After the attempt they are possibly treated at a hospital or by the GP. The majority have a psychiatric condition. A minority receive treatment.
In a year, their condition is characterised by*:
<div>No problems in walking about</div> <div>No problems with self-care</div> <div>•• Some problems with performing daily activities (<i>e.g. work, study, housework, family or leisure activities</i>)</div> <div>•• Moderate pain or discomfort (<i>fatigue</i>)</div> <div>•• Moderate anxiety or depression</div> <div>•• Moderate cognitive impairments (<i>with memory, concentration, disorganisation, IQ level</i>)</div>

* No bullet = no problems, 1 bullet = few problems, 2 bullets = some or moderate problems, 3 bullets = severe problems, 4 bullets = severe problems or incapacity.

Results

Characteristics of the panel

Most of the panellists are male (93.8%). Mean age of the panel is 54.6 years (SD=5.24), and the mean number of years in the medical profession is 25 (SD=6.83). The majority have a research background at PhD level (87.5%). Regarding specialism, 62.5% are psychiatrists and 37.5% are general practitioners. The majority are currently involved in patient care (81.2%).

Internal consistency of the panel

The reliability analysis demonstrates an excellent agreement among the panellists (Cronbach's $\alpha=0.98$). Excluding one or another panellist does not improve the overall Cronbach's α . The paired sample t-tests and Pearson correlations between the individual panellists and the panel-mean indicate that most panellists correlate strongly with the mean of the other panellists (see table 1). However, some panellists seem to value health states systematically lower (3, 5 and 8) or higher (1 and 10), as indicated by a significant deviation from the panel-mean. One panellist (2) correlates less strongly with the panel-mean, without significantly differing from it. This may indicate that certain health states were valued higher or lower, but that these differences cancelled each other out. Panellist 16 correlates less strongly with the panel-mean, but also differs significantly from the panel-mean. Overall, these deviations are too small to be reflected in the Cronbach's α when excluding a panellist. No panellist can therefore be identified as an outlier.

External consistency of the panel

Table 2 shows the paired sample t-tests and Pearson correlations between the DWs of our panellists and the corresponding DWs established in previous studies. Correlations are generally strong and the t-tests are not significantly different,

indicating a fair external consistency. From table 3 it becomes apparent that the majority of the DWs from our panel fall within the 95% confidence intervals (CIs) of previously estimated DWs. Health states 4, 7, 8 and 10 are exceptions. The 95% CIs reflect the uncertainty of the estimate, which may lead to an upper or lower bound that exceeds the theoretical minimum and maximum values of DWs (0 and 1). Figure 1 graphically displays the differences.

Table 1. Internal consistency. Paired samples t-test and Pearson correlations between each panellist and the panel mean

Pair	Panellist M(SD)	Panel ^a M(SD)	<i>t</i> (df)	<i>r</i>
1	0.55 (0.28)	0.40 (0.23)	5.95 (11)**	0.96**
2	0.48 (0.23)	0.41 (0.23)	1.38 (11)	0.65*
3	0.28 (0.22)	0.42 (0.23)	-9.44 (11)**	0.98**
4	0.47 (0.30)	0.41 (0.23)	1.41 (11)	0.89**
5	0.32 (0.23)	0.42 (0.23)	-3.43 (11)**	0.90**
6	0.38 (0.23)	0.41 (0.23)	-1.43 (11)	0.92**
7	0.37 (0.40)	0.41 (0.22)	-0.59 (11)	0.71**
8	0.31 (0.21)	0.42 (0.23)	-3.70 (11)**	0.90**
9	0.44 (0.26)	0.41 (0.23)	1.40 (11)	0.95**
10	0.50 (0.28)	0.40 (0.23)	2.44 (11)*	0.86**
11	0.44 (0.21)	0.41 (0.23)	0.72 (11)	0.84**
12	0.44 (0.30)	0.41 (0.23)	0.76 (11)	0.85**
13	0.43 (0.22)	0.41 (0.23)	0.97 (11)	0.94**
14	0.45 (0.30)	0.41 (0.23)	1.07 (11)	0.88**
15	0.42 (0.29)	0.42 (0.22)	0.30 (11)	0.95**
16	0.30 (0.17)	0.42 (0.24)	-2.46 (11)*	0.69*

N = 12 ; M = Mean; SD = Standard Deviation; R = Pearson correlation between panellist and panel mean; * $p < 0.05$; ** $p < 0.01$

^a Panel mean excluding compared panellist.

Disability weights for suicidality

The DW for suicidal thoughts is estimated to be 0.36 (SD=0.16; 95% CI 0.05; 0.67). Expressed as a utility, this is 0.64 (SD=0.16; 95% CI 0.33; 0.95). For mental distress involved in non-fatal suicide attempts, the DW is 0.46 (SD=0.13; 95% CI 0.20; 0.72). This corresponds to a utility of 0.54 (SD=0.13; 95% CI 0.29; 0.79).

Table 2. External consistency. Paired samples t-test and Pearson correlation between each panellist and mean DW from previous studies.

Pair	Panellist	Previous studies		
	M(SD)	M(SD)	<i>t</i> (df)	<i>r</i>
1	0.57 (0.30)	0.41 (0.27)	6.50 (9)**	0.97**
2	0.44 (0.23)	0.41 (0.27)	0.44 (9)	0.70*
3	0.28 (0.24)	0.41 (0.27)	-4.73 (9)**	0.95**
4	0.49 (0.32)	0.41 (0.27)	1.85 (9)	0.89**
5	0.31 (0.25)	0.41 (0.27)	-3.58 (9)**	0.95**
6	0.36 (0.25)	0.41 (0.27)	-2.74 (9)*	0.98**
7	0.39 (0.43)	0.41 (0.27)	-0.19 (9)	0.65*
8	0.32 (0.23)	0.41 (0.27)	-2.11 (9)	0.86**
9	0.47 (0.29)	0.41 (0.27)	3.64 (9)**	0.98**
10	0.49 (0.30)	0.41 (0.27)	1.75 (9)	0.89**
11	0.45 (0.22)	0.41 (0.27)	0.67 (9)	0.75*
12	0.43 (0.33)	0.41 (0.27)	0.56 (9)	0.91**
13	0.42 (0.23)	0.41 (0.27)	0.54 (9)	0.98**
14	0.46 (0.33)	0.41 (0.27)	1.25 (9)	0.94**
15	0.41 (0.32)	0.41 (0.27)	0.14 (9)	0.90**
16	0.30 (0.18)	0.41 (0.27)	-1.50 (9)	0.59

N = 10 ; M = Mean ; SD = Standard Deviation; R = Pearson correlation between panellist and mean previous studies; * $p < 0.05$; ** $p < 0.01$

Table 3. Agreement between DWs of previous studies and current study

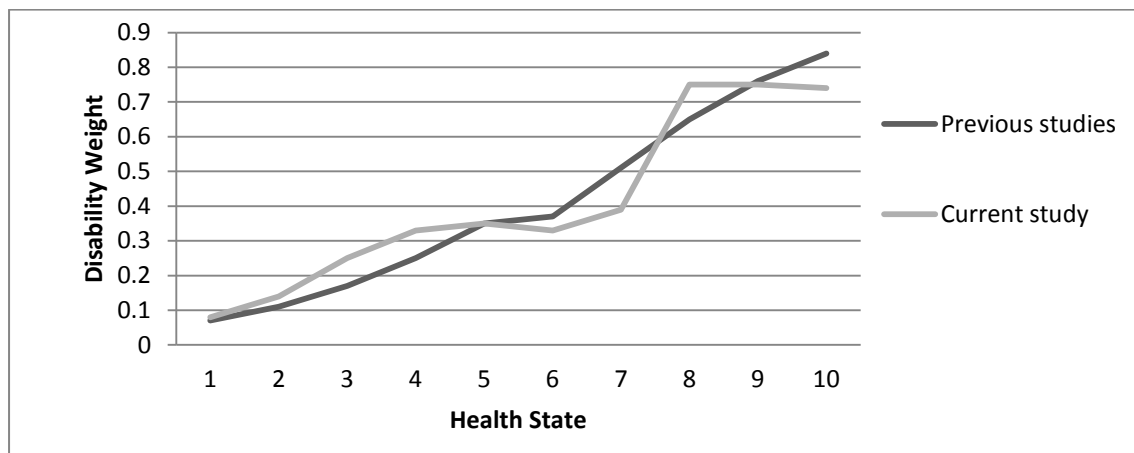
Health state		Previous studies		Current study	
		DW	95% CI	DW	95% CI
1	Constitutional eczema	0.07 ¹	0.01 ; 0.13	0.08	-0.06 ; 0.22
2	Cataract	0.11 ²	0.09 ; 0.14	0.14	-0.05 ; 0.33
3	Meningitis with permanent loco-motor impairment	0.17 ¹	0.04 ; 0.30	0.25	-0.11 ; 0.61
4	Macular degeneration	0.25 ²	0.21 ; 0.29	0.33*	-0.10 ; 0.76
5	Moderate heart failure	0.35 ¹	0.19 ; 0.52	0.35	0.09 ; 0.61
6	Moderate rheumatoid arthritis	0.37 ¹	0.22 ; 0.52	0.33	0.05 ; 0.61
7	Moderate to severe depression	0.51 ³	0.46 ; 0.56	0.39*	0.09 ; 0.69
8	Severe heart failure	0.65 ¹	0.60 ; 0.71	0.75*	0.42 ; 1.08
9	Meningitis with permanent loco-motor and cognitive impairment	0.76 ¹	0.65 ; 0.87	0.75	0.46 ; 1.04
10	Severe depression with psychotic features	0.84 ³	0.80 ; 0.88	0.74*	0.40 ; 1.08

* DW outside CI of previous studies ; CI = Confidence Interval

¹ Stouthard et al., 1997

² De Hollander et al., 2006

³ Kruijschaar et al., 2005

Figure 1. Comparison of DWs of previous studies and current study

Discussion

This paper presents the DWs for suicidal thoughts and for mental distress of non-fatal suicide attempts. It is notable that our DW for attempted suicide is very similar to the DW estimated in the Australian burden of disease study for self-inflicted injuries (0.447) (Mathers, et al., 1999). In contrast with the DW for physical injury after a suicide attempt (0.09) (Hoeymans & Schoemaker, 2010), the DW for mental distress involved in a non-fatal suicide attempt is relatively high. This implies that the disability of a non-fatal suicide attempt is largely attributable to the mental distress involved. When comparing the DW for suicidal thoughts with DWs for related psychiatric disorders, this shows that suicidal thoughts (0.36) are about as disabling as alcohol dependence (0.32) and cocaine dependence (0.33) (Smit, van Laar, Croes, & Busschbach, 2008). The DW for mental distress involved in non-fatal suicide attempts (0.46) is comparable with heroin dependence (0.43) (Smit, et al., 2008) and the mean weight of 0.46 for the various manifestations of depressive disorder (Kruijschaar, et al., 2005). Both the derived DWs are less severe than those for borderline personality disorder (0.54) (Mathers, et al., 1999) and schizophrenia (0.71; several psychotic episodes and some permanent impairments) (Stouthard, et al., 1997). When comparing the DWs for suicidality with somatic disorders, it becomes apparent that suicidal thoughts are as disabling as severe asthma (0.36) and moderate heart failure (0.35) (Stouthard, et al., 1997). Non-fatal suicide attempts match the DW for initial stage

Parkinson's (0.48) (Stouthard, et al., 1997). The above comparisons demonstrate the severity of suicidality.

Suicidality is often co-morbid with or symptomatic of psychiatric disorders. In general, much more empirical research is needed to clarify and disentangle comorbidity in the light of DWs. Currently, there are two ways of dealing with co-morbidity, but these may not be adequate. The first is by using an additive model in which the DWs of the co-morbid disorders are simply added. However, this may lead to an overestimation of the disability and possibly a DW exceeding 1. A way to overcome this is by using a multiplicative model. This model assumes that the combination of two health states is equal to the multiplication of both DWs belonging to each of the component health states ($DW_{12} = 1 - (1-DW_1) * (1-DW_2)$) (Mathers, et al., 1999). For example, if a person has alcohol dependence ($DW=0.32$) and suicidal thoughts ($DW=0.36$), the combined DW for both health states would be 0.56. As suicidality is regarded as a symptom of depression in the *DSM-IV-TR* it should be noted that our panel valued depression less severely than previous panels (0.39 versus 0.51 for moderate depression and 0.74 versus 0.84 for severe depression). This difference may have been caused by the implicit assumption of the panellists that suicidality was excluded from the descriptions of depression (while this was not the case). In future DW studies, it is recommended to bear this in mind.

Future use of the DWs

As stated in the introduction, DWs are an essential component in calculating DALYs and related metrics such as Quality Adjusted Life Years (QALYs; Dolan, 2000). Where data are available on necessary parameters (incidence and duration or point prevalence) the DWs estimated in this study can be used to calculate DALYs for suicidal thoughts and non-fatal suicide attempts. In the Netherlands, only data on year-prevalence are available. Using this would generate YLD of $462,500 * 0.36 = 166,500$ for suicidal thoughts and of $99,600 * 0.46 = 45,800$ for non-fatal suicide attempts. Adding the YLD of physical injury after attempted suicide (1,400) and years of life lost (YLL) due to suicide (43,500) (Hoeymans & Schoemaker, 2010),

would generate a total DALY disease burden of 257,100 for suicidality. Since no co-morbidity is taken into account and only data on year prevalence could be used, this calculation should be regarded as provisional. It should also be noted that a prevalence-based approach does not reflect recent changes in incidence and is mainly suitable for providing insight into present needs for health care, whereas an incidence-based approach would be more appropriate when estimating the effects of preventive interventions (Melse, Essink-Bot, Kramers, & Hoeymans, 2000). Computing the DALY disease burden due to suicidal thoughts and behaviours would be valuable in informing debates regarding, for example, priority setting in health care and research funding.

The complement of the DW, the utility (U), can be used in calculating Quality Adjusted Life Years (QALYs) (Dolan, 2000). QALY can be described as a year of life, adjusted for its quality. A year in perfect health is expressed by 1, a year in ill health by a value between 1 and 0, depending on disease severity. QALYs are often used in cost-utility analyses of medical or psychological interventions. Interventions can then be ranked in terms of the cost of gaining one QALY, which is of use in decision-making by policymakers and public health planners. Following from this, DWs or Us can also be used in cost-effectiveness analyses of interventions, which provide information about which intervention offers better value for money than its alternative for gaining one QALY or avoiding one DALY. However, as mentioned in the introduction, underlying assumptions and methodology for both health metrics have been criticised and should be taken into account when using the DWs.

Strengths and limitations

There are several indications that our findings are valid. First, the internal consistency of our panel was high, indicating good agreement among the panellists. Second, a fair external consistency was found. Furthermore, the similarity of our DW for non-fatal suicide attempts to the DW estimated in the Australian burden of disease study for self-inflicted injuries (0.447) (Mathers, et al., 1999) strengthens the reliability of our results.

The limitations of this study include the small panel of 16 experts, which resulted in relatively broad 95% confidence intervals. Also the fact that there is no standardised description or definition available of suicidal thoughts and non-fatal suicide attempts should be seen as a limitation. Furthermore, the DWs have been generated by an expert panel, whereas it is also possible to create a panel from a representative sample of the general population or people who experienced the health state directly. There is however no consensus in the literature on which kind of panel would be preferable. It is important to realise in this respect that using different kinds of panels may generate different estimations of the DWs. Patient panels for example tend to rate health states better than the general public (Damschroder, Zikmund-Fisher, & Ubel, 2005), and sometimes worse than expert panels (Suarez-Almazor, Conner-Spady, Kendall, Russel, & Skeith, 2001). The agreement between expert panels and general public panels seems to be good (Schwarzinger, Stouthard, Burström, & Nord, 2003). The decision to make use of an expert panel in this study was motivated by the fact that the studies with which we compared our results likewise made use of expert panels. Another, related, limitation may lie in the fact that the experts were not asked about personal experiences with any of the valued health states, which may have biased the results. However, since no outliers were detected in the analyses, there are no direct indications that any personal experiences have strongly affected the results. A final limitation lies in the fact that the DWs have been generated in a West European, high-income country, which may limit the generalisability of the findings.

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Chapter 3

Worrying and Rumination as Proximal Risk Factors for Suicidal Behaviour

Published as:

Kerkhof, A.J.F.M. & van Spijker, B.A.J. (2011). Worrying and Rumination as Proximal Risk Factors for Suicidal Behaviour. In: R.C. O'Connor, S. Platt & J. Gordon (Eds), *International Handbook of Suicide Prevention: Research, Policy and Practice* (pp. 199-209). Chichester: Wiley-Blackwell.

Abstract

Suicidal individuals are often tormented by ruminative, repetitive thoughts. These thoughts, which are commonly heard by clinicians, include: '*I wanted to stop my terrible thoughts*', '*Nobody loves me*', '*I am unlovable*', '*I cannot live alone*', '*I have no future*'. They can be torturing when rehearsed mentally many times a day for many hours. The wish to end consciousness can, itself, also become a repetitive, compulsive thought that is rehearsed up to 24 hours a day: '*I have to stop thinking*'. We hypothesise that the wish to end these repetitive thoughts is one of the driving forces behind the suicidal act. In the end, the continuous repetition of these statements becomes a compulsion that cannot be controlled. In that sense, repetitive thinking about dying, about stopping consciousness, and associated motives show similarities with characteristics of worrying and rumination. In this chapter, drawing from theory as well as empirical findings, we summarise the similarities between worrying/rumination and suicidal thinking. Theoretically, the chapter explores the notion of *Constructive and Unconstructive Repetitive Thinking* posited by Watkins (2008). The scant empirical findings are summarised. We conclude that, in many instances, suicidal thinking can be usefully conceptualised as a special type of extensive and prolonged worrying or rumination. Further research should endeavour to incorporate worrying or rumination as proximal risk factors in the suicidal process. Finally, we believe that the notion of suicidal worrying or suicidal rumination can be helpful both in research and in clinical care for suicidal patients.

Introduction

'My thoughts were so unbearable that I could not endure them any longer' is one of the most frequently cited motives for attempted suicide (as defined by De Leo, Burgis, Bertolote, Kerkhof, & Bille-Brahe, 2006) in empirical studies and in clinical practice (Hjemeland & Hawton, 2004; Hjemeland, et al., 2002). The unbearability of such thoughts may lie in both the content and the frequency with which they are repeated mentally. The contents of these terrible thoughts have been studied extensively, resulting in the identification of typical suicidal cognitions such as: *'Nobody loves me'*; *'I am unlovable'*; *'I have no future'*; *'My life has no meaning'*; *'I am better off dead'*; *'I can't stand my depression'*; *'When does this stop?'*; and *'When is there an end to my misery?'*. These thoughts frequently centre on hopelessness, helplessness, and distress tolerance (Rudd, Joiner, & Rajab, 2001).

The other aspect of the unbearability of these distressing cognitions, their frequency, has not received much attention. The importance of frequency became clear to us when we tried to measure the number of times suicidal cognitions were being rehearsed mentally during a day or the total amount of time spent each day by patients repeating their suicidal cognitions. We discovered that many suicidal clients were repeating their suicidal thoughts several hundred times a day, and that the total amount of time that these suicidal thoughts occupied their minds amounted to 10 to 15 hours per day. In times of crisis they became obsessive intrusions that kept clients awake for several days. The suicidal patients themselves attributed their sleeplessness and vital exhaustion to the impossibility of stopping these thoughts. Some even stated that this irrepressible repetition of suicidal thoughts was decisive in their suicide attempt. A typical example consisted of the endless repetition of a particular thought such as: *'I have to stop thinking'*, *'I have to stop thinking'*, *'I have to ...'*. For those who suffer from these obsessive thoughts, attempting suicide is often perceived as the only way out; suicide seems the logical means of stopping oneself thinking. We concentrate on this relatively neglected part of the suicidal process in this chapter. We recognise that within the psychological domain there are many studies on similar cognitive processes, such as obsessive intrusions, worrying, rumination, or repetitive thinking

(see Watkins, 2008). However, these processes are seldom linked to suicidal behaviour. Nevertheless, many similarities can be observed.

Similarities between Suicidal Thinking and Worrying or Rumination

Worrying can be defined as: *'A chain of thoughts and images negatively affect-laden and relatively uncontrollable, as an attempt to engage in mental problem-solving on an issue whose outcome is uncertain but contains the possibility of one or more negative outcomes'* (Borkovec, DePree, Pruzinsky, & Robinson, 1983, p. 10). Rumination is defined as: *'Behaviors and thoughts that focus one's attention on one's depressive symptoms and on the implications of these symptoms ... repetitively focusing on the fact that one is depressed, on one's symptoms of depression, and on the causes, meanings, and consequences of depressive symptoms'* (Nolen-Hoeksema, 1991, p. 569). Typical ruminative thoughts include: *'Why did this happen to me'* and *'Why do I feel so depressed?'* Both definitions emphasise the repetitive character of these processes and the uncontrollability experienced when worrying or ruminating. Worry and rumination are very similar to one another, so much so that they may share the same cognitive processes but involve different content (Watkins, 2008). In general, rumination has been aligned to depression, while worry has been associated with anxiety, but to complicate matters worrying is evident in depression and rumination is common in anxiety (Covin, Ouimet, Seeds, & Dozois, 2008; Simon, et al., 2007). There are numerous other terms that overlap or relate to worry and rumination, including perseverating cognition, stagnating deliberation, anticipatory stress, habitual negative self-thinking, cognitive and emotional processing, and mind wandering (see Watkins, 2008). However, the most global and neutral term for all of these processes is *repetitive thinking*, proposed by Watkins (2008). Worry, rumination, and repetitive suicidal thinking have similar characteristics and similar consequences. They each characterise a phenomenon that is repetitive (often occurring hundreds of times a day), uncontrollable (people say they cannot control these thoughts from occurring; they often occur without an obvious trigger), unstoppable (they cannot be stopped or postponed), future-oriented (*'My future has no meaning'*; *'I'll never be normal again'*; *'I will always remain a psychiatric patient'*; *'When will this stop?'*), threatening to major personal

concerns (a future that threatens the self and threatens relations with close family and friends), and offers neither solution nor relief. Moreover, meta-processing is possible: people can worry about their worries (Wells, 1995), ruminate about their ruminations, and become more suicidal because of their repetitive suicidal thoughts.

These different types of repetitive thinking also have similar consequences: worry, rumination, and repetitive suicidal ideation each produce obsessive attention to particular thoughts and, in respect of the thoughts one wishes to stop, they produce stress, sleeplessness, vital exhaustion, hopelessness, and helplessness. For the most part, they do not contribute to effective problem solving, sometimes resulting in a desire to end consciousness.

It is not surprising that worry and rumination are related to suicidal ideation: worry and rumination are associated with anxiety and depression, which are, in turn, associated with suicidal ideation. There are other commonalities: worry and rumination are related to neuroticism, probably reflecting a long-term vulnerability that occurs at times of stress; they also obstruct remission in depressed patients, and contribute to relapse (Watkins, 2008).

Within the rumination literature, a recent re-evaluation of one of the most commonly used scales to measure rumination identified two different ruminative dimensions, namely, *reflection* and *brooding* (Treynor, Gonzalez, & Nolen-Hoeksema, 2003). These two dimensions emerged following factor analysis of the Ruminative Response Scale (Nolen-Hoeksema & Morrow, 1991; Raes, Hermans, & Eelen, 2003). Reflection is concerned with overcoming problems and difficulties and refers to self-focus, which is aimed at problem solving in response to depressed mood. Brooding is characterised by thinking anxiously and/or gloomily about events, and refers to cognitions which compare one's present situation with another, unachieved benchmark (Morrison & O'Connor, 2008). In a series of recent studies, brooding seems to be particularly relevant in suicidality. However, there is some evidence that reflection may, in some circumstances be protective (see below).

Repetitive Thinking

Repetitive thinking has been defined as: ‘A process of thinking attentively, repetitively, or frequently about oneself and one’s world, which is at the core of many different models of adjustment and maladjustment’ (Segerstrom, Stanton, Alden, & Shortridge, 2003, p. 909). Watkins (2008) argues that repetitive thinking is engaged in whenever there is a reason to do so, mostly in the context of perceived problems or threats. Repetitive thinking can have constructive or unconstructive consequences depending upon certain characteristics of the repetitive thinking process. Repetitive thinking can be adaptive, functional, and beneficial across a range of scenarios, including in successful cognitive processing and recovery from upsetting and traumatic events, adaptive preparation and planning for the future, recovery from depression, and the uptake of health-promoting behaviours. In his review, Watkins suggests that unconstructive repetitive thinking is involved in the onset and maintenance of depression, that it predicts future depression, and increases negative affect when experimentally induced (see Watkins, 2008, p. 177). Questionnaires measuring worry and rumination have also been found to correlate highly with other measures of perseverative thinking, anxiety, and depression (Fresco, Frankel, Mennin, Turk, & Heimberg, 2002; Harrington & Blankenship, 2002; Papageorgiou, 2006; Segerstrom, Tsao, Alden, & Craske, 2000).

What characterises constructive and unconstructive repetitive thinking? According to Watkins (2008), there are several properties which are important: the valence of thought content (attention to positive or negative aspects of the self, optimism versus pessimism, etc.), the context (in a negatively valenced intrapersonal or situational context, repetitive thinking would amplify the effect of that context on mood and cognition, e.g.. mood-congruent memory), and the level of construal (the way in which people perceive, comprehend. and interpret actions of others towards him or herself; higher level construals are abstract, such as being unlovable, lower level construals are concrete, such as being afraid of failing your driving test tomorrow). In experimental studies, construals that cause participants most worry are those that tend to be more abstract and less concrete. In respect of suicidal ideation,

worrying in general seems to be very abstract. Thoughts about the future, future competency, hopelessness, and helplessness seem to be very abstract, global construals which contribute to prolonged worrying.

Worry Components

Research into pathological worry has revealed four major psychological components (Koerner & Dugas, 2006): intolerance of uncertainty (the most important); positive beliefs about worry; negative problem orientation/poor problem-solving; and cognitive avoidance. Koerner and Dugas describe individuals intolerant of uncertainty as people who *'believe that uncertainty is stressful and upsetting, that being uncertain about the future is unfair, that unexpected events are negative and should be avoided, and that uncertainty interferes with one's ability to function'* (Koerner & Dugas, 2006, pp. 202-203). When faced with a problem, intolerant individuals prefer a negative outcome to an uncertain one. Intolerance of uncertainty is thought to be a dispositional characteristic. This conceptualisation of intolerance of uncertainty has an immediate appeal as it may explain, in part, why suicidal persons worry so much. Facing an uncertain future, people who are high on intolerance will be upset and try to use cognitive avoidance to manage the anxious arousal associated with their anticipation of uncertainty. However, cognitive avoidance inevitably activates suppressed emotions and increases the anxious anticipation of the future. Consequently, we hypothesise that suicidal persons have higher levels of intolerance of uncertainty than non-suicidal persons.

Differential Activation Hypothesis

Many scholars have observed between-episode consistency in the recurrence of suicidal ideation (e.g. Williams, Crane, Barnhofer, van der Does, & Segal, 2006). The differential activation hypothesis posits that during episodes of depression associations are reactivated between sad mood and negative dysfunctional beliefs and cognitive biases. Several key factors determine whether one's initial depression becomes more severe or persistent, including the degree of activation and the content

of negative thinking patterns that become accessible in the depressed state (Lau, Segal, & Williams, 2004). Once established, these depressed cognitions are repeated over and over again. Consequently, a small setback or disappointment that leads to a mild mood fluctuation can trigger the chain of negative cognitions that have come to be associated with depression. This is also referred to as cognitive reactivity. If suicidal ideation becomes part of the pattern of thinking, it is more likely to re-emerge the next time the person is depressed. Worrying can trigger this chain of cognitions, and, when operating, this repetitive rehearsal of reactivated cognitions may show characteristics of worrying and rumination.

The differential activation hypothesis arose out of the ‘scar hypothesis’, which suggests that each successive period of depression leaves a scar on the mind of the patient rendering him or her more vulnerable the next time disappointment or failure is encountered (Lewinsohn, Steinmetz, Larson, & Franklin, 1981). Interestingly, the scar hypothesis in the case of rumination can be considered to be similar to the concept of a long-term vulnerability. In a seven-year longitudinal study by Beevers, Rohde, Stice, and Nolen-Hoeksema (2007), but of a sample of 496 female adolescents who were followed up, 49 experienced a first episode of major depression and then recovered. Subsequent analyses identified 13 ‘scarring’ variables that were elevated during and after the major depressive episode, but all of these were already elevated before the first episode. Negative emotionality, rumination, and social adjustment were elevated prior to the major depressive episode, but they became more pronounced during the episode and then, on recovery, returned to their baseline level (which already was elevated).

Empirical Studies

Morrison and O’Connor (2008) reported that, in 10 out of the 11 studies in their systematic review, increased rumination was associated with increased suicidality. This finding is even more impressive when account is taken of the heterogeneity of methods, samples, and measures of suicidal ideation or behaviour found in the studies. Five studies were cross-sectional, one was a case-control study, and five

studies employed a prospective design. In some of the studies, rumination was split into reflection and brooding. In one prospective study by O'Connor, O'Connor and Marshall (2007), brooding rumination was significantly positively correlated with suicidal ideation. In addition, in another prospective study (R. C. O'Connor & Noyce, 2008) brooding, but not reflection, significantly predicted suicidal ideation over a three-month period. However, both studies were conducted among college students, thereby limiting their generalisability. In a one-year prospective study, Miranda and Nolen-Hoeksema (2007) followed a community sample of adults and found that brooding and reflection predicted suicide ideation. Given the paucity of such studies, clearly there is a need for replication of these rumination effects in clinical samples.

One of the few studies to have employed a clinical population was a large-scale cross-sectional study of depressed ($n = 2,383$) and schizophrenic ($n = 1,920$) patients admitted to in-patient psychiatric care (Ahrens & Linden, 1996). In both groups the same set of factors were predictive of suicidality: hopelessness, social withdrawal, lack of activity, and ruminative thinking. Ahrens and Linden concluded that these factors constitute a suicidality syndrome that is independent of specific major psychiatric disorder: *'These symptoms merely appear to be the expression of an underlying predilection ... which in latent form would exhibit no symptoms. This syndrome only becomes clinically important if it is triggered by negative life situations, of which major psychiatric disorders are clearly prime examples'* (Ahrens & Linden, 1996, p. 85).

In a more recent study, which appeared after the Morrison and O'Connor (2008) review, Surreance, Miranda, Marroquin, and Chan (2009) compared 37 young adults with a history of attempted suicide with 59 controls without such a history. They found that brooding was associated with higher self-reported suicidal ideation, whereas reflection was not. However, reflection, and not brooding, interacted with suicide attempt history to predict suicidal ideation. Consequently, the authors concluded that *'among vulnerable individuals, in particular those with a history of a suicide attempt, a higher degree of reflective rumination is associated with increased suicidal ideation'* (Surreance, et al., 2009, p. 803). These data suggest that the relationship between the components of rumination and suicidal risk vary as a function of suicidal history. In another college student sample studied by the same research group (Chan, Miranda, & Surreance, 2009), depressive symptoms partially mediated the relationship between the

impact of life events and suicidal ideation and between brooding and suicidal ideation. This led Chan and colleagues to conclude that: *'People who brood in response to negative life events may be vulnerable to thinking about suicide, partly due to symptoms of depression, but also as a result of brooding itself'* (Chan, et al., 2009, p. 123).

A Dutch cross-sectional study (Antypa, van der Does, & Penninx, 2010) examined the association between reactivity of suicidal cognitions during recovery and the presence of suicidal ideation and behaviour during the previous depressive episode. In a hierarchical logistic regression analysis hopelessness, rather than rumination, predicted previous suicidal behaviour. Despite being limited by its retrospective study design, this is an important finding as it suggests that cognitive suicidal reactivity may be mediated largely by hopelessness. The findings of this study need to be replicated using a prospective design in order to determine the relative importance of rumination and hopelessness in the suicidal process.

In a seven-year follow-up study of the Dutch component of the WHO/EURO Multicentre Study on Suicidal Behaviour, a group of 40 suicide attempters showed elevated worry scores on the Penn State Worry Questionnaire (PSWQ) (mean score 51 compared with 34 in community samples) (Kerkhof, et al., 2000). PSWQ scores were significantly correlated with depression ($r = 0.49$) and hopelessness ($r = 0.37$).

In a Dutch study by Verwey, Bozdog, van Waarde, van Rooij, De Beurs, et al. (2007), attempted suicide patients assessed in hospital showed PSWQ scores well above normal (mean score of 59). When reassessed at home a few days later, they showed PSWQ scores of 62 (compared with 34 in community samples).

Discussion

Although much more sophisticated research designs are required in this domain, especially utilizing clinical samples, there is a preliminary consensus that rumination and worrying are related to suicidal ideation and to depression and hopelessness. Therefore, we conclude that worrying and rumination and associated recurrent hopelessness reflect a dispositional characteristic that explains cross-episode consistency in suicidal behaviour. The studies summarised here fit with the literature

on hopelessness, depression, and suicidality (Beck, Brown, Berchick, Stewart, & Steer, 1990).

The results are also concordant with the research in the field of self-focused attention (Ingram, 1990), emphasizing the role of self-referent internally generated information in various clinical disorders. Worrying and rumination can be understood as high levels of repetitive self-focused attention.

The results of this review are in line with work on explicit and automatic self-associations related to suicidal ideation. Automatic and explicit anxious and depressed self-associations are related to suicidal ideation and past suicide attempt (Glashouwer, et al., 2010). These automatic self-associations may explain why suicidal patients report difficulties in preventing and managing suicidal thoughts.

Clinical Implications

Awareness of worrying and ruminative self-talk by suicidal patients may provide new clues for the treatment of suicidal ideation. Indeed, cognitive behavioural treatment approaches, such as Wells' (2006) meta-cognitive therapy for worry, applied relaxation and cognitive therapy for pathological worry (Borkovec, 2006), and cognitive behavioural treatment targeting intolerance of uncertainty (Robichaud & Dugas, 2006), have led to good progress in the treatment of pathological worry and rumination. These approaches could usefully be modified for the more depressed (and anxious) suicidal patients. Although rumination in depression is now better recognised and addressed as part of the treatment of depression, more work is required to determine which treatments are most effective. Moreover, exercises fostering worry postponement, positive worrying, distraction, mindfulness, and so on can be helpful in psychological and psychiatric treatment. It would also be helpful to harness the Internet by developing and evaluating web-based self-help interventions for suicidal ideation which incorporate components on rumination and worrying. In the Netherlands such a web-based intervention is now being tested (van Spijker, van Straten, & Kerkhof, 2010). This intervention is based mainly on CBT, but also makes use of techniques derived from Dialectical Behaviour Therapy, Mindfulness Based

Cognitive Therapy, and Problem-Solving Treatment. It consists of six modules, each of which contains theory and several exercises. The repetitive style of thinking is addressed in the first module. Accompanying exercises aimed at reducing worry, for example, by confining (suicidal) worrying to 2×15 minute sessions per day, are also included in the first module. The second module targets improving one's toleration and regulation of intense emotions. In the third module, the ABC model is explained (A = Activating event, B = Belief about the event, C = Consequence, i.e., a consequence of the belief about the event and not a direct consequence of the event itself), followed by focus on common distortions in thinking in the fourth module. The fifth module concerns challenging one's negative thoughts. In the sixth and final module, attention is directed at relapse prevention. The results of this ongoing study are not yet available and the efficacy of such an intervention has yet to be determined. In clinical practice, the notion of suicidal worrying has been welcomed by chronic suicidal patients and this has been helpful in individual cases (Kerkhof & van Luyn, 2010). Clinicians have been trained in the application of worry techniques in their treatment of suicidal patients and found such techniques to be easy to apply.

Conclusion

In conclusion, there is some empirical evidence for a rather strong notion that worrying and rumination can be proximal risk factors for suicidal behaviour. This is a new and additional way of explaining suicidal developments, in terms that appear helpful in understanding and treating suicidal individuals, especially those that think about suicide repetitively for many hours per day.

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Chapter 4

The Quality of Online Suicide Prevention in the Netherlands and Flanders in 2007

Published as (in Dutch):

van Ballegooijen, W., van Spijker, B.A.J. & Kerkhof, A.J.F.M.(2009). De Kwaliteit van Online Suïcide Preventie in Nederland en Vlaanderen in 2007. *Tijdschrift voor Psychiatrie*, 51, 117-122.

Abstract

The Internet can provide valuable support for persons with suicidal tendencies. By means of the Google search engine we found and categorised 153 Dutch language websites dealing with suicide. Websites relating to suicide prevention ($n = 23$) were scored for quality against a list of 17 quality features. Results indicate that the standard of Dutch language suicide prevention websites is not optimal. Improvement is needed particularly in the field of e-help, such as increasing interactive functionality.

Introduction

There are indications that the Internet is an easily accessible source of help for suicidal people, as they are not always inclined to seek help from their General Practitioner or from mental health services (Harris, 2008). Reasons for this may include feelings of shame at having these thoughts, fear of being stigmatised or thinking that problems are unsolvable. It is therefore important that high quality and useful information on suicidality is available on the Internet.

To date, not much has been published concerning Dutch language online suicide prevention. A short overview from 2002 demonstrates that informative sites about suicide prevention are of reasonable quality (Degraeve & Pieters, 2002). Due to the rapid development of the Internet, an update of the overview is required.

We therefore carried out an investigation to address the following questions: what suicide-related websites are available in Dutch and what is the quality of online suicide prevention.

Method

We searched for relevant websites on Google. Four different searches were carried out, using the keywords 'suicide' (suicide), 'zelfmoord' (synonym for suicide), 'zelfdoding' (synonym for suicide), and 'ik wil dood' (I want to die). These searches were restricted to pages in the Dutch language. This method was intended to approximate the search method of a suicidal person, as well as to find more official websites. From the search results, the first 50 hits to be displayed were included. The websites found were viewed and put into an inventory using an adapted version of the classification system of Degraeve and Pieters (2002) (table 1). Hits on different pages of the same website were categorised separately, but each page could only be included once in the list. Irrelevant and inaccessible sites were not taken into consideration.

Classification

Internet pages that offer help, advice and information for suicidal persons are classified as “suicide prevention”. Sub-categories employed were “personal” for personal accounts, “religious” for suicide prevention from a religious perspective and “organisation” for professional and voluntary help and support bodies. Sites of a purely informational nature were categorised as “articles”. Websites were categorised as “pro-suicide” if suicide was recommended or glorified. Other pages were categorised as either “culture” (with the sub-categories “music”, “computer games”, “jokes”, “literature” and “other”), “interactive communications” (mainly discussion forums), “weblogs”, “news and media”, “religious” (for religious websites where suicide is written about without this being from a clear preventive viewpoint) or “other organisations”. This last category has been subdivided into the sub-categories “bereaved by suicide” and “other”.

Quality features

Seventeen quality features were formulated based on the check list of Degraeve en Pieters (2002), the warning signs for suicidality of the American Association of Suicidology (Mandrusiak, et al., 2006), and information from principal chapters from the Handbook of suicidal behaviour (Eggermont, van den Bulck, & Kerkhof, 2007; Kerkhof, 2007; Maes & Kerkhof, 2007; Neeleman, 2007). Retrieved suicide prevention websites received a rating of –, 0 or + for each quality feature, which yielded respectively 0, 1 and 2 points.

Quality features coded included presence of general information about suicidality, whereby prevalence, causes, risk factors and symptoms should be described; mention of the twelve *consensus warning signs of suicide* (Mandrusiak, et al., 2006); and validation/ acknowledgment that the situation of a suicidal person is serious whilst not regarding it as hopeless. Advising not to harm oneself, accompanied by alternatives; inclusion of the consequences of suicidal behaviour, but in a non-judgmental way; and making it clear that suicidality is temporary in nature and can be treated, were also coded for. Recommendations and information regarding referrals to

GPs or mental health services; telephone helplines; and websites of fellow sufferers, patient organisations, or the Netherlands Association for Voluntary Euthanasia (NVVE,) were coded for, as was the expertise of the organisation behind each website. Here, ‘expert’ was defined as being trained in the field of mental healthcare.

Four features focusing on interactive help and support were included: the presence of 1) a self-test, 2) a chat room, 3) a discussion forum and 4) the option of e-help. This assessment took into account the level of professionalism and the extent to which use was made of these options. One-to-one chat with someone providing help and support was coded as e-help rather than as a chat room. A further feature was the presence of information for family members of a suicidal person, and the final two included features referred to what should *not* be encountered on suicide prevention sites, namely descriptions of suicide methods and propaganda in the discussion forums and/or the contributions of members. Here, pro-suicide, pro-choice, anti-suicide and “pro-life” statements were counted as propaganda. If no discussion forum was present then a 0 was coded for this last feature. Websites were regarded as satisfactory if more positive than negative characteristics were present. This came down to a score of 18 points. Ten suicide prevention sites were assessed by a second assessor so that the level of agreement between the assessors could be established.

Results

The first 50 hits of each of the four searches led to 182 different Internet pages, of which 3 were inaccessible and 26 were irrelevant. In total, 153 Internet pages were categorised. The related inventory is provided in Table 1. The pages in the category “culture”, sub-category “literature” consisted predominantly of poems which were posted on weblogs. One weblog did not fall within the category of “culture”.

The 23 websites for suicide prevention were then assessed for quality. Out of these, 6 scored a satisfactory mark. Of these, 3 were from the Netherlands, and 3 were from Flanders. Table 2 provides the ratings and overall scores for the 6 satisfactory suicide prevention sites. These 6 stood out largely due to inclusion of the features: “temporary nature of suicidality” and “referrals to the GP or mental health services”.

The level of agreement between assessors was 89%.

All sites in this 6 received a + rating for these features, as opposed to 12% of the 17 other suicide prevention sites. An investigation of which quality features occurred the most was also undertaken. Only + ratings were counted. These percentages are also included in Table 2.

Discussion

Many suicide-related websites exist in the Dutch language and 15% of these fall into the category of “suicide prevention“. The most numerous contain news reports, which make up 31% of the total. We did not encounter any pro-suicide websites.

With respect to the classification process of Degraeve and Pieters from 2002 it has turned out that there are now relatively more news reports to be found about suicide on the Internet. The two investigations differed in terms of search method employed, however. A comparison between the present study and Degraeve and Pieters’ regarding website quality is not possible because just two of the nine sites assessed in the previous study were included in the category of “suicide prevention“. This cannot be attributed solely to differences in search method, as some sites no longer exist or no longer offer information about suicide. Given the transitory nature of websites this is not surprising.

Table 1. Inventory of accessed suicide related websites (N=153)

Website category	N (%)
Suicide prevention	23 (15)
<i>Personal</i>	1
<i>Religious</i>	5
<i>Organisation</i>	17
Articles	19 (12)
Prosuicide	0 (0)
Culture	25 (16)
<i>Music</i>	7
<i>Computer games</i>	3
<i>Jokes</i>	3
<i>Literature</i>	10
<i>Other</i>	2
Interactive communication	13 (18)
Blogs	1 (1)
News and media	47 (31)
Religious	2 (1)
Other organisations	23 (15)
<i>Relatives</i>	12
<i>Other</i>	11

Table 2. Frequency of the quality features as percentages of the 23 suicide prevention websites, and separate rating and overall scores of the top 6.

	Total	Top 6					
	Frequency of the quality features	www.pratenonline.nl	www.zelfmoordpreventie.be	www.zelfmoordpreventie.be	www.zelfmoordpreventievlaanderen.be	users.skynet.be/oase/suicide1*	www.co.nl/ronduit > helpdesk >zelfmoord**
General information	13%	0	+	0	+	+	0
Warning signals	4%	0	0	0	0	+	-
Taking suicidality seriously	48%	+	+	+	+	0	0
Advice not to engage in self-harming behaviour	26%	+	-	+	+	-	+
Pointing out consequences diplomatically	0%	-	0	0	0	0	0
Describing temporary nature of suicidality	35%	+	+	+	+	+	+
Referrals to GP or mental health services	35%	+	+	+	+	+	+
Referral to telephone helplines	43%	+	+	-	+	+	-
Links to patient organisations	17%	+	0	-	0	+	-
Organisation behind website	43%	+	+	0	+	+	0
Self-test	4%	+	-	-	-	-	-
Discussion forum	35%	+	-	+	-	-	+
Chatroom	0%	-	-	0	-	-	0
Option of e-help	13%	+	+	0	-	-	-
Information for family members	30%	-	+	+	0	+	+
No descriptions of suicide methods	74%	+	+	0	+	0	+
No propaganda in discussion forum	35%	+	0	+	0	0	+
Total score		26	22	21	21	20	19

NVVE=Netherlands Association for Voluntary Euthanasia;

* This website is no longer online; ** via 'geloof en leven' – 'helpdesk' – 'zelfmoord'

Out of all the sites investigated in this study only 6 were found to be satisfactory. The three Flemish sites from the top 6 stood out due to their professionalism and high quality information, whilst the three best Dutch sites focused more on support and interaction. A possible explanation for the difference in professionalism between Dutch and Flemish sites is that suicide prevention is in fact supported by the Flemish authorities but not by the Dutch authorities.

Nowhere did we find information targeting ethnic minority groups. Research has found that suicide attempts by Turkish and Surinamese females are two to three times more frequent than by native females (Burger, van Hemert, Bindraban, & Schudel, 2005).

The suicide prevention sites investigated in this study have many negative points, indicating that there is room for improvement. Important information, such as warning signs, is still lacking on the majority of sites, but above all the administrators of these sites must work on including more interactive options. More self-tests would be welcome, as would chatrooms supervised by professionals. Perhaps the most important recommendation is that the offer should be extended to include professional e-help. E-help is not often available and exists predominantly in the form of chatrooms with a person providing support.

It is possible that not all Dutch language websites for suicide prevention were included in the inventory. Any websites not included were not captured by the search method used, suggesting that the administrators of these sites could consider enhancing the searchability of these sites.

There is still relatively little known about the positive and negative effects of Internet usage by suicidal persons. The Internet facilitates searching for help and support, but the risk of suicide may also be increased (Alao, Soderberg, Pohl, & Alao, 2006). It is also not yet known to what extent suicidal persons are helped by suicide prevention sites and to what extent e-help is effective with regard to suicidality. More research is required. In the media and in some case studies a predominantly negative picture is painted of Internet usage by suicidal persons due to the inciting effect or the danger of imitation. One should however not lose sight of the fact that the Internet can also be an important medium for suicide prevention.

Conclusion

There are many Dutch language web pages available relating to suicidality. The quality of Dutch language online suicide prevention would appear to be suboptimal. Above all, the areas of e-help and other interactive options leave room for improvement. From the 23 suicide prevention websites examined, 6 were found to be satisfactory.

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Chapter 5

The Effectiveness of a Web-Based Self-Help Intervention to Reduce Suicidal Thoughts: A Randomised Controlled Trial

Published as:

van Spijker, B.A.J., van Straten, A. & Kerkhof, A.F.J.M. (2010). The Effectiveness of a Web-Based Self-Help Intervention to Reduce Suicidal Thoughts: A Randomized Controlled Trial. *Trials*, 11, 25.

Abstract

Background

Suicide, attempted suicide and suicidal thoughts are major public health problems worldwide. Effective face-to-face treatments are Cognitive Behavioural Therapy (CBT), Dialectical Behavioural Therapy (DBT) and Problem Solving Treatment (PST). However, about two-thirds of persons who die by suicide have not been in contact with mental health care services in the preceding year, and many have never been treated. Furthermore, many patients do not disclose their suicidal thoughts to their care provider. This may be out of shame, due to fear of stigma or due to lack of trust in (mental) health care. Since many suicidal individuals seek information online, the Internet provides an opportunity to reach suicidal individuals who would not be contacted otherwise. By providing a self-help intervention online, persons can anonymously learn to gain control over their suicidal thoughts. There is convincing evidence that self-help is effective for a number of mental disorders. In this study the effectiveness for suicidal thoughts is examined.

Methods/Design

In this study, a recently developed self-help intervention will be evaluated in a Randomised Controlled Trial. The intervention is based on Cognitive Behavioural Therapy and is aimed at subjects who experience mild to moderate suicidal thoughts. This is defined as a score between 1 and 26 on the Beck Scale for Suicidal Ideation (BSS). Higher and lower scores are excluded. In addition, severely depressed subjects are excluded. In total, 260 subjects will be randomly allocated to the intervention-condition (N=130) or to the information-control condition (N=130). Self-report questionnaires will be filled out at baseline, 6 weeks after baseline and 18 weeks after baseline. Primary outcome measure is the reduction in frequency and intensity of suicidal thoughts. Secondary outcome measures are the reduction of hopelessness, anxiety and depression, sleeplessness, worry and quality of life measures.

Discussion

This study is the first to evaluate the effectiveness of a web-based self-help intervention for suicidal thoughts. Several limitations and strengths of the design are discussed.

Background

Suicide, suicidal behaviour and suicidal thoughts are major public health problems worldwide. In the Netherlands, around 1500 persons die by suicide each year, which accounts for 1% of all deaths (CBS, 2009). In addition, an estimated 120.000 suicide attempts occur each year (Neeleman, 2007). The lifetime prevalence of suicidal thoughts in the adult Dutch population is estimated to be 11% (ten Have, et al., 2006). Suicidal behaviours generally are preceded by suicidal thoughts. A population-based study in the USA showed that 34% of individuals with suicidal thoughts developed specific suicide plans, while 26% directly proceeded to an attempt. In addition, 72% of those who developed a plan proceeded to an attempt (Kessler, Borges, & Walters, 1999). In order to prevent suicidal plans and behaviours, prevention should be aimed at suicidal thoughts.

The majority of persons with suicidal thoughts (80%-82%) meet the criteria of a psychiatric disorder (Kessler, Berglund, Borges, Nock, & Wang, 2005). Most prevalent is depression. Suicidal thinking is one of the most severe symptoms of depression and is characterised by extreme negative thoughts about the self. It has been suggested that relapse in both depression and suicidality is attributed to ‘cognitive reactivity’ (Teasdale, 1988; Williams, van der Does, Barnhofer, Crane, & Segal, 2008). This means that once suicidal thoughts are experienced during an episode of depression, the likelihood that such thoughts will reoccur in a subsequent episode may be increased (Lau, Segal, & Williams, 2004; Williams, Crane, Barnhofer, van der Does, & Segal, 2006). This ‘Differential Activation Theory’ of suicidality underlines the importance of aiming prevention at an early stage of the suicidal development.

Many suicidal individuals are reluctant to disclose their suicidal thoughts to others and to seek help. An international review showed that two-thirds were not in contact with mental health care services within the year before the suicide (Luoma, Martin, & Pearson, 2002). In the Netherlands, this is estimated to be 64% (Huisman, Robben, & Kerkhof, 2009). An explanation could be that many adults who experience suicidal thoughts do not perceive a need for care (Brook, Klap, Liao, &

Wells, 2006). Moreover, there seems to be a negative relationship between levels of suicidal thoughts and help-seeking (Deane, Wilson, & Ciarrochi, 2001). Factors that contribute to this 'help-negation effect' may be shame, fear of stigma, lack of trust in mental health care, and prejudices about health care providers. Bearing this in mind, suicidal individuals could benefit from accessible, anonymous help. The Internet can play an important role in providing this.

The Internet has become an important source of information and means of communication. Worldwide, around 23.5% of the population has access to the Internet (IWS, 2009). Dutch Internet access is among the highest in the world (91%) (CBS, 2009). In general, it has been found that persons with stigmatizing psychiatric illnesses are likely to use the Internet to access health information and to communicate with professionals about their condition (Berger, Wagner, & Baker, 2005). The anonymity of the Internet may be an important explanation for this (Leach, Christensen, Griffiths, Jorm, & Mackinnon, 2007). Overall, the Internet could be an effective tool in reaching individuals with suicidal thoughts who would not be reached otherwise, or would come into contact with mental health care in a late phase of their suicidal process. For suicidal persons who are being treated, it could be an additional source of help.

Worldwide, there are numerous suicide-related websites. In 2007, a search for English suicide-related websites showed that 13% of the retrieved websites was aimed at prevention or support (Biddle, Donovan, Hawton, Kapur, & Gunnell, 2008). An inventory of Dutch suicide-related websites revealed a similar percentage that was aimed at prevention (van Ballegooijen, van Spijker, & Kerkhof, 2009). In general, not much is known about the quality of suicide prevention websites and scientific evaluation of the effectiveness of such websites is lacking. It is therefore not well established what effects prevention websites may have on suicidal individuals.

Although a substantial number of individuals with suicidal thoughts do not seek help, effective treatments exist. Evidence about effectiveness is currently available for Cognitive Behavioural Therapy (CBT), Dialectical Behaviour Therapy (DBT) and Problem Solving Treatment (PST) (Hawton, et al., 1999; Linehan, et al., 2006; Tarrier, Taylor, & Gooding, 2008; Townsend, et al., 2001; van den Bosch, Koeter, Stijnen, Verheul, & van den Brink, 2005; Verheul, et al., 2003). However, these studies only

include face-to-face treatments. In other mental disorders it has been shown that treatments do not necessarily have to be delivered in face-to-face format. Particularly CBT can also be effectively delivered in a self-help format (either a book or through the Internet). Self-help therapy can be defined as a standardised psychological treatment that the patient works through independently at home. Numerous randomised trials have shown that self-help is effective in reducing depressive symptoms, symptoms of anxiety, problem drinking, social phobia and health problems such as headache (Carlbring, et al., 2007; Cuijpers, van Straten, & Andersson, 2008; Riper, et al., 2008; Spek, et al., 2007). For suicidal thoughts, a few self-help books are available, but these have not been scientifically evaluated. To our knowledge, no Internet self-help treatments for suicidal thoughts are yet available.

In summary, prevention should be aimed at the onset of suicidal thoughts. The Internet can facilitate accessible interventions that may reach suicidal individuals who would not be reached otherwise. In this study, the effectiveness of a recently developed web-based self-help intervention for suicidal thoughts is evaluated in a randomised controlled trial.

Methods/Design

Design

This study is a randomised controlled trial comparing a web-based self-help intervention with a waitlist control condition. The intervention is aimed at persons with mild to moderate suicidal thoughts. Subjects in the control condition will have access to an information website and will start the intervention after the experimental group has finished (i.e. after six weeks). Assessments will take place at baseline, 6 weeks after baseline and 18 weeks after baseline.

This study was approved by the Medical Ethics Committee of the VU University Medical Center (registration number 2008/204).

Sample size

The sample size of this study is based on the expected effect on the primary outcome measure, i.e. the reduction in frequency and intensity of suicidal thoughts. In order to be able to demonstrate a clinically relevant effect-size of 0.35 with $\alpha = 0.05$ and $\beta = 0.80$, 100 subjects are needed in each condition. When including an expected dropout of 20-30%, the total sample size is determined at 260. The effect-size of 0.35 is based on effect-sizes found in other studies into Internet interventions, mainly for depression (Andersson & Cuijpers, 2009; Spek, et al., 2007).

Inclusion and exclusion criteria

In order to be eligible for the study, subjects have to meet five inclusion criteria. First, the minimum age of subjects is set at 18 years. Second, subjects need to experience mild to moderate suicidal thoughts. This is defined as a score between 1 and 26 on the Beck Scale for Suicide Ideation (BSS) (Beck & Steer, 1991). Subjects with no suicidal thoughts (BSS = 0) are excluded as they cannot benefit from this intervention. Subjects with severe suicidal thoughts (BSS ≥ 27) are excluded because they need more extensive care. Third, subjects should not be severely depressed. A severe depression is defined as a score ≥ 40 on the Beck Depression Inventory (BDI) (Beck, Steer, & Brown, 1996). Severely depressed subjects are excluded because they need more extensive care and may not be focused enough to finish the intervention. Both severely suicidal and severely depressed subjects are advised to seek help elsewhere. Fourth, subjects need to have sufficient command of the Dutch language. Finally, subjects need to have access to Internet and an e-mail address.

Inclusion procedure

In order to reduce attrition, a multi-staged inclusion procedure will be used to filter out impulsive applicants who are likely to drop out. Subjects will be recruited through advertisements in newspapers and via banners on the Internet. Through these banners, subjects will be directed to a website where a brief description of the study

will be provided. On this website, subjects will also be able to register for the study. To register, subjects are required to fill out their age, the BDI, and the BSS, which will serve to screen for severe depression and suicide risk. Subjects under 18 will receive an automated response that they are too young to participate. Subjects who are severely depressed ($BDI \geq 40$) and / or at high risk for suicide ($BSS \geq 27$), will receive an automated response which explains that participation is precluded. In addition, the urgent advice to seek help is given, which will be facilitated by providing names and websites of relevant organisations in the Netherlands. An automated response is chosen since subjects have not yet provided us with contact information and informed consent. The BSS also serves to detect absence of suicidal thoughts ($BSS < 1$). In this case, an automated response explaining that participation is not possible is generated. In this response, subjects are advised to visit the GP since applying for this course might indicate that the subject has other (mental health) problems.

When eligible for participation ($BSS < 27$ and $BDI < 40$), subjects are required to fill out an e-mail address. They subsequently will receive an e-mail that contains an information brochure, an informed consent form and a link to the baseline questionnaire. On the consent form, subjects have to fill in their contact information, as well as contact information of their GP. This information will only be used if necessary (see ‘safety of subjects’). After giving informed consent and filling in the baseline questionnaire, subjects will be included and randomised.

In addition to filling out an e-mail address, eligible subjects are asked to (voluntarily) fill out additional information on gender, age, educational level, social situation (living alone or together), current use of mental health care, and importance to remain anonymous. This information will be used to compare subjects who are included with those that eventually decline participation. It is expected that a substantial number of potential subjects will decline participation because the intervention is offered in a research context in which it is not possible to remain anonymous. Individuals who prefer to remain anonymous, the potential target population, may differ from persons who participate in the study. By obtaining additional data, differences may be identified. On the website, it will be explained why this information is requested and how it will be processed.

Randomisation

Subjects will be randomised in blocks of 20 after stratification for gender. An independent researcher makes the allocation schedule using random allocation software. Subjects will be informed about the randomisation outcome by means of an e-mail, which will also contain a login code for the assigned condition.

Safety of subjects

Since this study will be conducted in a vulnerable population in which suicide may occur, a safety protocol has been developed. In addition to the pre-, post and follow-up measures, suicidal thoughts will be assessed bi-weekly in both the experimental and the control condition during the first six weeks by means of the BSS and the BDI. The safety protocol will be applied when a subject exceeds the determined cut-off scores, i.e. $BSS \geq 27$ or $BDI \geq 40$. When this occurs, the researchers will contact the subject by phone on the same day the score is received to assess the suicide risk and contact the GP if necessary. If the phone is not answered, calling will be continued for two days on different times of the day. In case of no response after two days, a standardised e-mail expressing worry will be sent. In this e-mail, it will also be requested to contact the researchers. In addition, it will be explained that the GP will be contacted three days after sending this e-mail. If the GP is not reached, the locum GP is contacted. In case a subject drops out of the study, i.e. does not fill in the questionnaires, an e-mail will be sent with the request to reply and the explanation that the GP will be contacted in case of no reply within three days.

Intervention

Background

Our self-help intervention is based on Cognitive Behavioural Therapy (CBT). CBT nowadays is a widely used and extensively researched treatment. The effectiveness is supported by numerous studies for many mental disorders (Butler, Chapman, Forman, & Beck, 2006). In addition to CBT, components of Dialectical Behaviour

Therapy (DBT), Problem Solving Treatment (PST), and Mindfulness Based Cognitive Therapy (MBCT) are used in several exercises. DBT is a treatment program developed for borderline personality disorder and has been proven effective in reducing suicidal behaviour (Linehan, et al., 2006; Verheul, et al., 2003). PST focuses on improving interpersonal problem solving skills and can be used for the treatment of a variety of mental disorders. It has shown promising results with regard to the treatment of suicidal thoughts (Eskin, Ertekin, & Demir, 2008; Townsend, et al., 2001). MBCT was developed to prevent relapse and recurrence of depression (Teasdale, et al., 2000), but may also be helpful in the treatment of suicidal thoughts (Williams & Swales, 2004). It combines mindfulness meditation with cognitive therapy.

CBT, DBT, PST and MBCT are all rooted in cognitive therapy (Beck, 1976). The underlying cognitive model states that emotion and behaviour are influenced by the way events or situations are interpreted. Dysfunctional cognitions can underlie these interpretations and contribute to the development of mental disorders. The cognitive model was originally aimed at explaining psychological processes in depression, but has been expanded to other mental disorders. Although suicidal thoughts and behaviours are not classified as a separate mental disorder, they are related to many mental disorders (Brown, et al., 2005). Dysfunctional thoughts seen in suicidal individuals often involve hopelessness, helplessness and unlovability (Rudd, Joiner, & Rajab, 2001). Cognitive therapy techniques aim at restructuring such dysfunctional cognitions. In addition the ruminative, repetitive style of thinking often experienced by suicidal persons can be addressed with cognitive techniques (Chan, Miranda, & Surrence, 2009; Morrison & O'Connor, 2008; Surrence, Miranda, Marroquin, & Chan, 2009).

Structure

The intervention consists of six modules, each of which can be completed in one week. A module starts by providing information, followed by an assignment and several exercises. Subjects are strongly advised to complete those. In addition, each module contains a number of optional exercises from which the subject can choose the ones that appeal to him. Finally, each module is provided with a number of

‘Frequently Asked Questions’. Here, subjects can also actively pose questions which will be answered on a general, non personal level. Consequently no personal feedback or support by a therapist will be offered. Ideally subjects need to spend at least 15 minutes twice a day to perform the exercises. Every week, an automated e-mail is sent as a reminder of the new module and as motivation to complete it.

Content of the modules

- Module 1 aims at teaching subjects to gain more control over their suicidal thoughts. The worrisome, repetitive aspects of suicidal thinking are outlined, and the exercises are aimed at reducing worry.
- Module 2 teaches subjects to recognise and prevent an upcoming crisis. An important message is that seemingly unbearable thoughts can be tolerated. Main goal is that subjects learn to tolerate and regulate intense emotions in a crisis situation.
- Module 3 explains the ‘ABC model’ which states that emotions (Consequences) are caused by a person’s Belief about an Activating event (the trigger). Exercises focus on identifying automatic thoughts.
- Module 4 describes common distortions in thinking. Exercises deal with recognizing and changing them.
- Module 5 is about challenging negative thoughts by evaluating evidence for and against the validity. Exercises also focus on formulating thoughts in a more detailed and neutral way.
- Module 6 explains the possibility of relapse. Also, attention is given to the picture of the future and possible future setbacks. Exercises focus on making a relapse prevention plan and on formulating a more realistic picture of the future.

Waiting list control condition

Subjects in the control condition can access a website where information on suicidality is provided. The information is meant to inform them about the nature and possible causes of their thoughts and feelings. Discussed themes are prevalence, risk factors and warning signs. Also, information about treatment in general is provided,

as well as links to several mental health organisations. After six weeks, subjects are provided with a login code for the intervention.

Instruments

Due to the self-help character of this study, all measures are self-reports. No diagnostic instrument is administered.

Primary outcome measure – suicidal thoughts

The primary outcome measure in this study is the reduction in frequency and intensity of suicidal thoughts, which is measured by the Beck Scale for Suicide Ideation. The Beck Scale for Suicide Ideation, self report (BSS) (Beck, Steer, & Ranieri, 1988) is a 21-item instrument to detect and measure the severity of suicide ideation. The BSS parallels the Scale for Suicide Ideation (SSI), which is a semi-structured interview (Beck, Kovacs, & Weissman, 1979). Each item is scored from 0 to 2. The first five items of the BSS serve to screen for suicide ideation. If the subject selects zero for both item 4 and 5, he or she is instructed to go to item 20. Otherwise, all items are filled out. The last two items (20 and 21) assess the number of suicide attempts and the intent to die during the last attempt. The total score is obtained by adding the first 19 items, and ranges from 0 to 38. A higher score indicates more severe suicide ideation. The BSS has high internal reliability with Cronbach alpha ranging from 0.87 to 0.97, and moderate test-retest reliability ($r=0.54$). The concurrent validity is high with the SSI (0.90 – 0.94), and moderate with the BDI suicide item (0.58 – 0.62).

Secondary outcome measures

Secondary outcome measures include depressive symptoms, hopelessness, anxiety symptoms, worrying, quality of life and costs related to health care utilisation and production loss.

Depressive symptoms

The Beck Depression Inventory Second Edition (BDI-II) measures the severity of a depression, and is used to detect the presence of depressive symptoms (Beck, et al.,

1996; van der Does, 2002). This questionnaire was introduced in 1961 and is one of the most frequently used and validated instruments to assess depressive symptoms. The total score ranges from 0 to 63 and is obtained by adding the 21 items, which are rated on a 4-point scale (0-3). A higher score indicates more severe depressive symptoms. Interpreting the scores, a total score between 0 and 13 corresponds with minimal depression, 14-19 with mild depression, 20-28 with moderate depression, and 29-63 with severe depression. In both American and Dutch samples, good convergent validity and internal consistency were demonstrated (van der Does, 2002).

Hopelessness

The Beck Hopelessness Scale (BHS) assesses hopelessness (Beck & Steer, 1988). The BHS contains 20 'true-false' statements. Each statement is scored 0 or 1, resulting in a total score range of 0 to 20. A higher score indicates more hopelessness. The BHS is one of the most frequently used measures of hopelessness, and has excellent internal consistency and test-retest reliability. In addition, several studies have supported the predictive validity of the BHS for suicide attempts and suicide (Brown, 2001).

Anxiety symptoms

The anxiety subscale of the Hospital Anxiety and Depression Scale (HADS-A) was used to assess anxiety symptoms (Bjelland, Dahl, Haug, & Neckelmann, 2002). This subscale consists of 7 items, rated on a 4-point scale (0-3). Total score therefore ranges from 0 to 21, with higher scores indicating more anxiety symptoms. In several normal and clinical Dutch samples, homogeneity and test-retest reliability were good, with Cronbach alpha ranging from 0.80 to 0.84 (Spinhoven, et al., 1997).

Worrying

The Penn State Worry Questionnaire (PSWQ) was developed in 1990 to measure excessive and uncontrollable worrying (Meyer, Miller, Metzger, & Borkovec, 1990). Subsequently, an adapted version was published, which assesses pathological worry in the past week (PSWQ-PW) (Stöber & Bittencourt, 1998). The PSWQ-PW is a 15 item self-report inventory with a 7 point rating scale, ranging from 'never' (0) to 'almost always' (6). The total score ranges from 0 to 90, with a higher score indicating more

worrying. The PSWQ-PW shows good reliability and substantial convergent validity. It assesses both weekly status of worry and treatment-related changes of worry during treatment, which makes it suitable for monitoring pathological worry in research settings (Stöber & Bittencourt, 1998).

Quality of life

The EuroQol (EQ-5D) (Brooks, 1996) is a standardised non disease specific instrument for describing and valuing health related quality of life. It consists of five items (mobility, self-care, usual activities, pain/discomfort and anxiety/depression). Each item is rated as ‘no problem’ (1), ‘some problem’ (2), or ‘extreme problem’ (3). The resulting health state can therefore be expressed by a five-digit number. In addition, it is required to rate current health state on a thermometer ranging from 0 (worst imaginable health state) to 100 (best imaginable health state).

Costs: health care utilisation and production loss

Health care utilisation and production loss are evaluated by means of the Trimbos/iMTA questionnaire for Costs associated with Psychiatric Illness (TiC-P) (Hakkaart-van Roijen, van Straten, Donker, & Tiemens, 2002). The TiC-P consists of two different parts that can be administered separately. Part I is concerned with measuring the direct costs of care consumption of subjects with psychiatric disorders. It consists of 15 items, but can be customised for the study population. Items that are considered irrelevant can be left out. Part II is meant to determine indirect costs resulting from production loss associated with psychiatric disorders. It consists of the Short Form Health and Labor Questionnaire (SF-HLQ) (Hakkaart-van Roijen). The SF-HLQ contains three modules covering absence from paid employment, production loss without absence from paid employment and impediments to paid or unpaid employment.

Functioning

The Work and Social Adjustment Scale (WSAS) (Mundt, Marks, Shear, & Greist, 2002) measures impaired functioning attributable to an identified problem. It is a five-item scale, with each item being rated on a 0 (no impairment at all) to 8 (very severe

impairment) scale. The WSAS is valid and reliable. Internal consistency ranges from 0.70 to 0.94. Test-retest correlation was 0.73.

Statistical analyses

To test the hypothesis that the self-help intervention is superior to the control condition, the analysis will be conducted on an Intention to Treat basis following the pertinent BMJ & Consort guidelines. Missing observations at follow up will be imputed by regression imputation or multiple imputations, stratified for predictors of outcome and loss to follow-up. Relative improvements in frequency and intensity of suicidal thoughts in the experimental group in comparison with the control group will be calculated by Cohen's *d*. For this confirmatory analysis the primary outcome measure is used (BSS). To the exploratory analyses of the secondary outcome measures, a Bonferroni correction will be applied to control the overall Type I error rate.

Discussion

This paper describes the study protocol of a randomised controlled trial comparing a web-based self-help intervention to reduce suicidal thoughts with a control condition. To our knowledge, this is the first self-help application targeted specifically at suicidal thoughts. This aspect simultaneously might give rise to the idea that focusing mainly on suicidal thoughts could instigate suicidal thoughts or even suicidal behaviour. Even though this is a widespread belief, this idea is not validated in psychology or psychiatry (Gould, et al., 2005).

The described study design has several methodological limitations. First, Internet interventions in general and self-help applications in particular are subjected to high attrition rates (Eysenbach, 2005). Dropout from the study (dropout attrition) can introduce a selection bias and therefore be a threat to validity. In order to reduce dropout attrition, the questionnaires are presented separately from the intervention website and reminders are sent. Dropout from the intervention (nonusage attrition)

may result in an underestimation of the effect size. In order to reduce nonusage attrition, subjects receive a motivating (automated) e-mail each week. Besides trying to reduce attrition, it will be analysed thoroughly (as has been suggested by Eysenbach) (Eysenbach, 2005).

Second, anonymous participation is not possible because subjects are at risk for suicide, and we wanted to be able to monitor them and take action if necessary. As a result, the study population may differ from the target population. In order to identify possible differences, several demographics are obtained before registration.

Finally, no diagnostic interview is conducted. This makes it impossible to diagnose psychiatric disorders, but is in keeping with the self-help character of the intervention. It is also in accordance with the eventual purpose of use, since the intervention will become available for people with suicidal thoughts in general, irrespective of the presence of a possible psychiatric disorder. A feature of the described design that decreases the generalisability to this target group, is that severe suicidal and severe depressed subjects are excluded. The rationale for this is that they need more extensive care.

One of the strengths of this study lies in the design itself since the number of randomised controlled trials concerning suicidality is relatively limited (Goldney, 2005; Hawton, et al., 1999). In general, suicide intervention research has been described as challenging due to methodological difficulties and ethical considerations (Oquendo, Stanley, Ellis, & Mann, 2004). As a result, there still is a paucity of information on the effectiveness of treatments for suicidal persons. The present study can contribute to increasing knowledge on this subject. A second and related unique aspect of this study is that suicidal thoughts are the primary target of the intervention. Often, suicidal thoughts are treated as part of a depression. However, suicidal thoughts not only occur in depression, but are related to many mental disorders.

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Chapter 6

Effectiveness of Online Self-Help for Suicidal Thoughts: Results of a randomised controlled trial

Submitted as:

van Spijker, B.A.J., van Straten, A. & Kerkhof, A.F.J.M. Effectiveness of Online Self-Help for Suicidal Thoughts: Results of a Randomised Controlled Trial.

Abstract

Background

Many people with suicidal thoughts do not receive treatment. Internet can be used to reach more people in need of support.

Aims

To test the effectiveness of unguided online self-help to reduce suicidal thoughts.

Method

236 adults with mild to moderate suicidal thoughts were randomised to the intervention (n=116) or a waitlist control group (n=120). Assessments took place at baseline, and 2, 4 and 6 weeks later. Outcome measures were suicidal thoughts, depressive symptoms, anxiety, hopelessness, worry, and health status.

Results

The intervention group showed a significant greater improvement in suicidal thoughts ($d=0.28$), hopelessness ($d=0.28$), worry ($d=0.34$), and health status ($d=0.26$). Effects were more pronounced for participants who completed at least three modules.

Conclusions

Online self-help is effective in reducing suicidal thoughts. Although effect sizes were small, the reach of the Internet could enable this intervention to contribute appreciably to suicide prevention.

Introduction

Although effective treatments exist (Brown, et al., 2005; Hawton, et al., 1999; Linehan, et al., 2006; Tarrier, Taylor, & Gooding, 2008; van den Bosch, Koeter, Stijnen, Verheul, & van den Brink, 2005; Verheul, et al., 2003) data from a recent worldwide survey show that 44% of suicidal people in high income countries do not receive any form of treatment (Bruffaerts, et al., 2011). Frequently reported barriers to seeking help were attitudinal (endorsed by 54% of suicidal respondents) (Bruffaerts, et al., 2011). These included a preference for self-reliance (handling the problem alone), believing spontaneous recovery will occur without (the need for) treatment, thinking the problem is not severe, believing that treatment will not be effective, and fear of stigma. Another substantial proportion of respondents (45%) indicated a low perceived need for treatment. Least reported were structural barriers such as limited finances and transportation problems (Bruffaerts, et al., 2011). In middle and low income countries, the numbers of suicidal people not receiving treatment are even higher (Bruffaerts, et al., 2011). Barriers to seeking treatment not included in this survey may include shame; fear of losing autonomy; fear of rejection; and prejudice against, and/or past negative experiences with, health care providers. Providing anonymous help online may address some of these obstacles, and several initiatives have already revealed an enormous need for this kind of support for suicidal people (Barak, 2007; Mokkenstorm, Stut, & Bakker, 2010). Moreover, people who receive mental health treatment could benefit from an additional online intervention as it is not uncommon for both patients and care providers to avoid exploring the issue of suicidality during consultations (Burgess, Pirkis, Morton, & Croke, 2000).

Web-based interventions have been found effective for a range of mental disorders, e.g. depression (Andersson & Cuijpers, 2009; Andrews, Cuijpers, Craske, McEnvoy, & Titov, 2010), anxiety (Andrews, et al., 2010; Cuijpers, et al., 2009), and problem drinking (Riper, et al., 2008). An increasing number of studies show that guided web-based self-help interventions can be equally effective as face-to-face interventions (Andrews, et al., 2010). This paper presents the results of the first randomised controlled trial (RCT) comparing unguided web-based self-help for

suicidal thoughts with a waitlist control group. It was hypothesised that the intervention would be better in reducing suicidal thoughts than the control condition, but expected a small effect size given previous findings that effect sizes for unguided self-help are generally modest and lower than those for guided self-help (Andersson & Cuijpers, 2009).

Methods

Design, Setting, and Participants

Participants for this RCT were recruited between October 2009 and November 2010 through advertisements on websites (e.g. www.113online.nl), in newspapers, and Google Adwords. To be eligible for the study, participants needed to be aged at least 18, have access to the Internet and e-mail, know Dutch well, have mild to moderate suicidal thoughts, and not be severely depressed. Mild to moderate suicidal thoughts were defined as a score between 1 and 26 on the Beck Scale for Suicide Ideation (BSS; Beck & Steer, 1991). Being severely depressed was defined as a score >39 on the Beck Depression Inventory (BDI; Beck, Steer, & Brown, 1996). These two criteria were established in consultation with clinical experts, and were employed because people with severe suicidal thoughts and/or severe depression are likely to need more intensive care and may not be focused enough to work through the intervention. These criteria were also used for the safety procedure (see ‘safety of participants’). Already receiving help, regardless of the source, was not an exclusion criterion for this study. Conversely, participants in both conditions were advised to seek (face-to-face) help.

Eligibility was assessed using an online application procedure. Respondents who exceeded the cut-off scores (i.e. BSS>26 and / or BDI>39) were referred to other (mental health) services by means of an automated response. Eligible respondents were requested to fill in their e-mail address, as well as responding to several questions regarding gender, age, educational level, living situation (alone or together), current use of mental health care, and the importance they placed on remaining

anonymous during the study. Subsequently, they were sent an information brochure, an informed consent form, and a link to the baseline questionnaire. Participants were required to disclose their identity and that of their general practitioner (GP) on the consent form in order to be able to apply the safety procedure.

Participants were randomised to either the intervention or the waitlist control condition by an independent researcher using a block design (20 per block) and stratified by gender. The randomisation outcome was communicated immediately by e-mail with either a log-in code for the intervention website or a link to a website with general information on suicidality for the control group. Six weeks after randomisation, the control group received log-in codes for the intervention website. The study was approved by the Medical Ethics Committee of the VU University Medical Centre (registration number 2008/204) and written informed consent was obtained after the procedures had been fully explained.

Safety of participants

As this study involved participants at risk of suicide, a safety protocol was followed. Whenever participants in either condition filled in a questionnaire and exceeded the cut-off scores of 26 on the BSS and/or 39 on the BDI, they were phoned, a risk assessment was done, and if necessary, their GP was contacted. Participants' GPs were also contacted if a participant could not be reached (van Spijker, van Straten, & Kerkhof, 2010).

Intervention

This trial's unguided self-help intervention is based on Cognitive Behavioural Therapy (CBT) (Beck, 2005), but also makes use of components of Dialectical Behavioural Therapy (DBT) (Linehan, 1993a, 1993b), Problem Solving Therapy (PST) (Townsend, et al., 2001), and Mindfulness Based Cognitive Therapy (MBCT) (Segal, Williams, & Teasdale, 2002; Williams & Swales, 2004). All these treatment programs have evidence for their effectiveness in reducing suicidality (Brown, et al., 2005;

Hawton, et al., 1999; Linehan, et al., 2006; Tarrier, et al., 2008; Williams, Duggan, Crane, & Fennell, 2006).

The main goal of this intervention is helping participants decrease the frequency and intensity of their suicidal thoughts. A focus on controlled thinking, rather than thought cessation, should lead to reduced suicidal thinking. It consists of six modules, which consecutively focus on 1) the repetitive character of suicidal thoughts (Kerkhof & van Spijker, 2011), 2) regulating intense emotions, 3) identifying automatic thoughts, 4) thinking patterns, 5) thought challenging, and 6) relapse prevention.

Participants follow one module per week and can receive up to six motivating automated e-mails. Although no structural guidance is offered, there is a FAQ function on the website via which questions can be asked. For a more detailed description of the intervention, see the study protocol (van Spijker, et al., 2010).

Participants in the control condition received access to a website constructed for this study where information on suicidality was provided, such as prevalence rates, common risk factors, and warning signs. In addition, common treatment options were listed and links to several mental health care institutions were provided. This information would take about 15 minutes to read.

Outcome measures

All questionnaires were self-report and administered via the Internet. The primary outcome measure was the reduction of suicidal thoughts, assessed with the 21-item Beck Scale for Suicide Ideation (BSS) (Beck & Steer, 1991) at baseline (T0), 2 and 4 weeks into the intervention (T1 and T2), and at post-test (6 weeks after baseline: T3). Total score of the BSS ranges from 0 to 38, with higher scores indicating more severe suicidal thoughts. The BSS has high internal reliability and moderate test-retest reliability (Beck & Steer, 1991; Beck, Steer, & Ranieri, 1988).

Depressive symptoms, a secondary outcome measure, was also assessed at T0, T1, T2, and T3, using the Beck Depression Inventory Second Edition (BDI-II) (van der Does, 2002). A total score between 0 and 13 indicates minimal depression, 14-19 mild depression, 20 to 28 moderate depression, and 29-63 severe depression. The BDI has good internal consistency (van der Does, 2002).

Other secondary outcome measures were assessed only at T0 and T3. These included hopelessness (Beck Hopelessness Scale (BHS), score range 0-20 (Beck, Brown, Berchick, Stewart, & Steer, 1990; Beck & Steer, 1988), anxiety symptoms (Hospital Anxiety and Depression Scale (HADS-A), score range 0-21 (Zigmond & Snaith, 1983), and worry (Penn State Worry Questionnaire Past Week (PSWQ-PW), score range 0-90 (Stöber & Bittencourt, 1998)). A higher score on these questionnaires indicates more severe symptoms. Health status was measured using the thermometer of the EuroQol (Brooks, 1996), ranging from 0 (worst imaginable health status) to 100 (best imaginable health status).

Power analyses

Sample size was based on the expected effect on the primary outcome measure, i.e. the reduction of suicidal thoughts. In order to be able to detect an effect size of 0.35 with $\alpha=0.05$ and $\beta=0.80$, 100 subjects were needed in each condition. Including an expected drop-out attrition rate of 20-30% in each group, the sample size was determined at 260.

Statistical analyses

Demographic and clinical characteristics of participants and people who declined participation were compared using t-tests and χ^2 tests. The same procedures were also used to test whether the control and intervention groups differed significantly on these characteristics at baseline.

Difference in drop out attrition rate (i.e. drop out from the study) (Eysenbach, 2005) between both conditions was analysed using χ^2 test. Subsequently, t-tests and χ^2 tests were conducted to detect differences in baseline characteristics between participants who dropped out and those who did not. Next, multiple imputation was used to replace missing values.

Non-usage attrition (i.e. drop out from the intervention) (Eysenbach, 2005) was analysed using χ^2 tests and One-way Analysis of Variance (ANOVA) to detect

differences at baseline between three groups based on adherence (within the intervention condition): 1) participants who did not start the intervention, 2) participants who completed one or two modules, and 3) participants who completed at least three modules.

For all outcome measures, mean change from baseline to post-test was analysed using t-tests on the multiply-imputed intention to treat (ITT) sample. Degrees of freedom were adjusted according to Barnard and Rubin (Barnard & Rubin, 1999). Subsequently, between-group effect sizes were calculated according to Cohen's *d* (Cohen, 1988).

These analyses were repeated using an 'adherent' sample. First, participants in the intervention group who did not start the intervention (*n*=26) were excluded from the analysis. Next, the grouping variable was split into three levels: control group (*n*=120), intervention participants who completed one or two modules (*n*=25), and intervention participants who completed at least three modules (*n*=65).

Subsequently, the primary outcome measure was analysed more thoroughly using a linear mixed model (LMM) to model change over time in suicidal thoughts, assuming a linear effect. The LMM procedure includes incomplete cases in the analysis and estimates their missing values by means of restricted maximum likelihood estimates. Time was included as a continuous variable, condition was treated as a fixed effect, and the intercept was included as a random effect. The LMM procedure assumes that data are missing at random (MAR). The LMM procedure was performed on both the ITT and the adherent sample (using a dataset without imputed values).

Use of the safety procedure was evaluated by simple counts of the number of calls to participants and GPs. Differences in number of calls between the intervention and the control group were tested using χ^2 tests. In addition, an estimation of the total number of suicide attempts was made based on self-reported attempts in the questionnaires.

All analyses were conducted using SPSS for windows version 17.0.

Results

Participants

The enrolled sample size was smaller than anticipated ($N=236$), but since the drop out attrition rate was smaller as well (with a maximum of 10.6% at T2), this did not affect the power.

Figure 1 shows the participant flow through the trial. The registration website received 2,484 visits during the inclusion period. About half of these visits represented respondents who failed to complete the screening questionnaire ($N=1216$, 45.7%). The remaining 1268 visitors completed the screening, after which almost half proved to be ineligible ($N=562$, 44.3%), mainly due to severe depressive symptoms ($N=468$, 83.3%). Another substantial proportion was eligible, but failed to return the informed consent form ($N=417$, 32.9%). A small percentage of eligible respondents was excluded for various other reasons at this point, the most common being a failure to provide an email address, making it impossible for the information brochure and informed consent form to be sent ($N=53$, 4.2%). The remaining 236 eligible respondents returned their informed consent forms and were randomised.

An analysis comparing respondents who gave informed consent and thus became participants of the trial ($N=236$) with those who declined ($N=417$) indicated that study participants were slightly older (40.89 vs. 37.17 years, $t(622)=3.25$, $p=0.001$) and higher educated ($\chi^2(3)=7.81$, $p=0.050$). Moreover, participants rated anonymity less important than people who declined participation (39.8% and 61.9% respectively, $\chi^2(1)=30.44$, $p=0.000$) and more often reported receiving some form of care (55.5% and 42.6% respectively, $\chi^2(2)=10.37$, $p=0.006$). There was no difference in severity of suicidal thoughts or depressive symptoms between participants and declined respondents.

Table 1 displays baseline characteristics for all participants randomised. The majority was female ($N=156$; 66.1%), born in the Netherlands ($N=218$; 94.0%) and had received education on an intermediate level ($N=112$; 47.5%). A minority lived with a partner ($N=95$; 40.3%) and had one or more children ($N=87$; 37.5%). Mean

age of the total sample was 40.93 (SD=13.71) and half was in paid employment (N=116; 50.0%). Regarding clinical characteristics, the average scores of the total sample at baseline reveal substantial levels of suicidal thoughts (M=14.85, SD=7.08), depression (M=27.06, SD=9.17), hopelessness (M=14.38, SD=3.73), anxiety (M=10.37, SD=3.70), worry (M=57.80, SD=11.27), and health status (M=61.32, SD=18.01). There were no differences at baseline between the two conditions regarding demographic or clinical characteristics.

Attrition

Dropout attrition rates for the full sample were 6.8% (N=16) at T1, 10.6% (N=25) at T2, and 8.9% (N=21) at T3. In total, 21 persons dropped out of the study, equally spread over the control (N=10) and intervention (N=11) groups ($\chi^2(1)=0.096$, $p=0.757$). Another eleven had intermittent missing values at T1, T2, or both, and were not included in the drop out analysis.

Reasons for dropout attrition included lack of time (N=4), recovery of symptoms (N=3), admission to a psychiatric hospital (N=2), not finding the intervention useful (N=3), participation in another study (N=1), or were not specified (N=8). Comparison of baseline characteristics showed that participants who dropped out felt more hopeless at baseline (M=16.95 vs. M=14.23; $t(230)=1.98$, $p=0.049$). For the remaining characteristics, no significant differences were found.

Analysing non-usage attrition in the intervention condition showed that 26 participants (22.4%) did not start the intervention. Twenty-five participants (21.6%) completed one or two modules and 65 (56.0%) completed at least three modules. ANOVA revealed no statistical differences in baseline characteristics between these groups. Participants in the intervention group reported having spent 10.5 hours on the whole intervention, i.e. an average of 15 minutes per day over the six weeks.

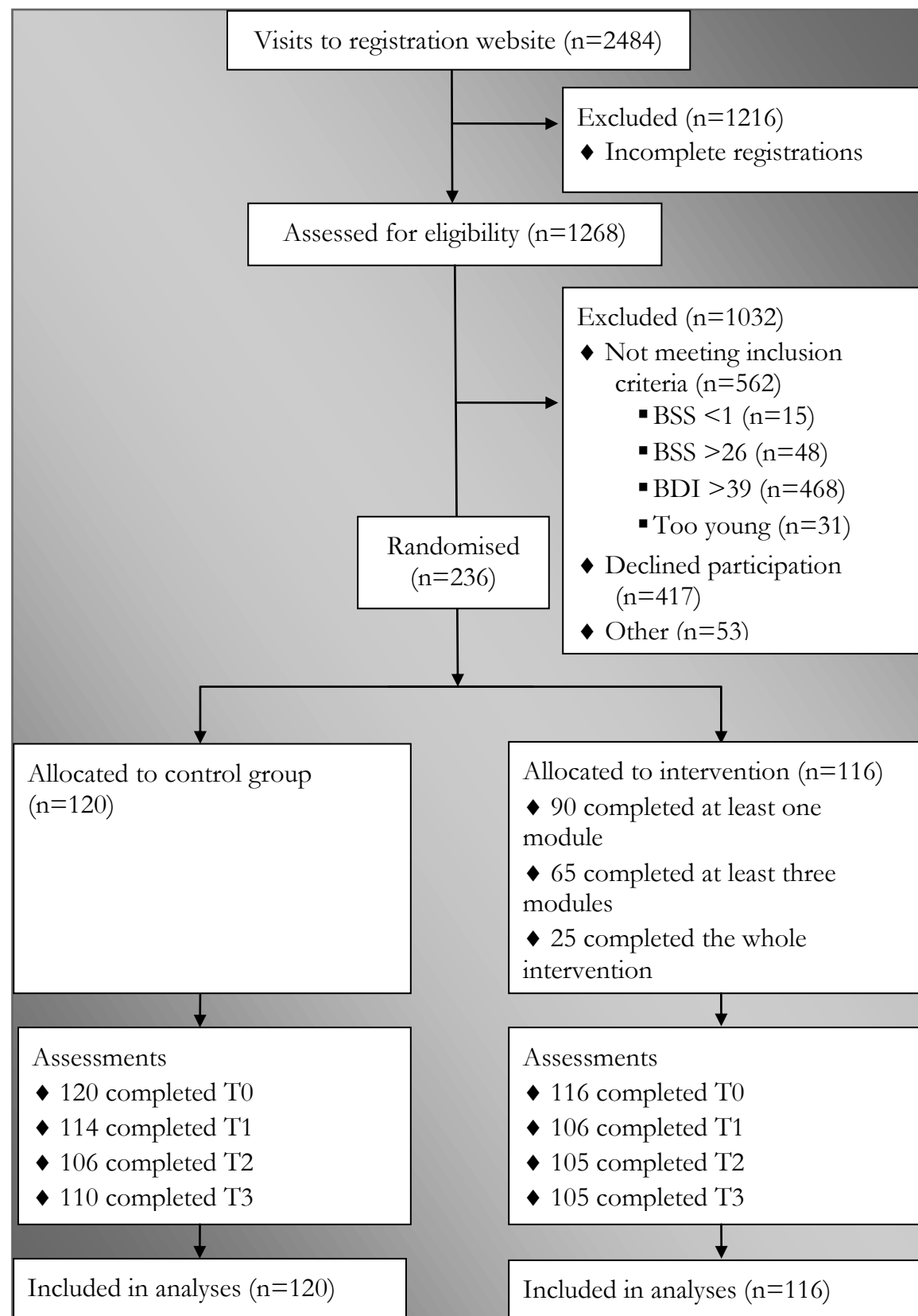
Figure 1. Participant flow through trial

Table 1. Baseline characteristics of total sample.

		Condition		
	Total	Control	Intervention	<i>p</i>
	(N=236)	(N=120)	(N=116)	
Demographic characteristics				
Female gender (N, %)	156 (66.1)	80 (66.7)	76 (65.5)	0.852
Age (M, SD)	40.9 (13.7)	41.4 (13.4)	40.5 (14.1)	0.602
Education (N, %)				
Lower	19 (8.1)	8 (6.7)	11 (9.5)	0.365
Intermediate	112 (47.5)	52 (43.3)	60 (51.7)	
Higher	90 (38.1)	51 (42.5)	39 (33.6)	
Other	15 (6.4)	9 (7.5)	6 (5.2)	
Living with a partner (N, %)	95 (40.3)	54 (45.0)	41 (35.3)	0.131
Has children (N, %) ¹	87 (37.5)	50 (42.0)	37 (32.7)	0.145
Born in the Netherlands (N, %) ¹	218 (94.0)	111 (93.3)	107 (94.7)	0.651
Paid employment (N, %) ¹	116 (50.0)	59 (49.6)	57 (50.4)	0.895
Clinical characteristics				
Suicidal thoughts (M, SD)	14.9 (7.1)	14.5 (7.3)	15.2 (6.8)	0.444
Attempted suicide (N, %) ¹				
Never	137 (59.1)	73 (61.3)	64 (56.7)	0.688
Once	39 (16.8)	20 (16.8)	19 (16.8)	
More than once	56 (24.1)	26 (21.8)	30 (26.5)	
Depressive symptoms (M, SD)	27.1 (9.2)	26.5 (9.0)	27.6 (9.3)	0.364
Hopelessness (M, SD) ¹	14.4 (3.7)	14.1 (3.9)	14.7 (3.5)	0.204
Worry (M, SD) ¹	57.8 (11.3)	56.9 (11.5)	58.8 (10.9)	0.199
Anxiety (M, SD) ¹	10.4 (3.7)	10.1 (3.9)	10.6 (3.5)	0.346
Health status (M, SD) ¹	61.3 (18.0)	62.6 (18.2)	60.0 (17.8)	0.289

¹Missing: N=4, of which 1 in control and 3 in intervention group.

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Main outcome measures (ITT sample)

In table 2, the mean change between baseline and post-test in all continuous outcome measures for the intervention group, compared with the control group, are displayed. The results show significantly greater improvement in suicidal thoughts ($t(98)=-2.12$, $p=0.036$), hopelessness ($t(200)=-2.18$, $p=0.029$), worry ($t(186)=-2.60$, $p=0.010$) and health status ($t(201)=2.00$, $p=0.045$) in the intervention group compared with the control group. Between-group effect sizes were small, ranging from 0.26 for health status and 0.28 for suicidal thoughts and hopelessness to 0.34 for worry.

Table 2. Mean change from baseline to post-test and effect sizes.

	Control (N=120)	Intervention ¹ (N=116)	d ¹	Intervention, 1 or 2 modules ² (N=25)	d ²	Intervention, ≥ 3 modules ³ (N=65)	d ³
Suicidal thoughts (M, SD)	2.30 (6.57)	4.47 (8.72)*	0.28	3.47 (6.15)	0.17	5.45 (8.30)**	0.44
Depressive symptoms (M, SD)	1.82 (8.76)	3.93 (10.12)	0.22	4.94 (11.30)	0.32	4.85 (9.19)*	0.34
Hopelessness (M, SD)	0.68 (3.61)	1.91 (4.95)*	0.28	1.27 (5.85)	0.14	2.68 (5.08)**	0.48
Worry (M, SD)	2.12 (10.08)	5.48 (10.12)**	0.34	6.00 (11.80)	0.36	6.40 (10.48)**	0.43
Anxiety (M, SD)	0.51 (3.29)	1.03 (3.88)	0.14	0.48 (3.95)	0.01	1.60 (3.71)*	0.32
Health status (M, SD)	3.00 (18.29)	-1.96 (19.71)*	0.26	0.07 (21.45)	0.15	-2.36 (21.20)	0.27

¹ ITT sample: intervention group compared with control group

² Adherent sample: Group that completed 1 or 2 modules compared with control group

³ Adherent sample: Group that completed at least 3 modules compared with control group

* $p < 0.05$

** $p < 0.01$

The results for suicidal thoughts were confirmed by the LMM procedure. Besides a significant improvement over time in both groups ($F(1, 656)=63.34, p<0.001$), there was a significant time-by-group interaction effect ($F(1,656)=8.38, p=0.004$), indicating a greater reduction of suicidal thoughts in the intervention group. Specifically, the average reduction in the intervention group (1.58 points on the BSS) was twice as much per time unit (i.e. two weeks) as in the control group (0.74 points on the BSS) ($t(656)=2.90, p=0.004$). See figure 2.

Main outcome measures (adherent sample)

Repeating the analyses on the adherent sample revealed significant differences in mean change between the control group and participants in the intervention group who completed at least three modules. The latter showed a greater improvement for suicidal thoughts ($t(159)=-2.84, p=0.005$), depressive symptoms ($t(169)=-2.21, p=0.027$), hopelessness ($t(167)=-3.11, p=0.002$), worry ($t(147)=-2.78, p=0.006$), and anxiety ($t(168)=-2.07, p=0.039$) (see table 2). Between-group effect sizes were small for anxiety ($d=0.32$) and depression ($d=0.34$), and medium for suicidal thoughts ($d=0.44$), worry ($d=0.43$), and hopelessness ($d=0.48$). No significant differences between the control group and participants in the intervention group who completed one or two modules were detected.

The LMM procedure showed a significant improvement over time for the three groups on suicidal thoughts ($F(1,599)=44.54, p<0.001$) and a significant time-by-group interaction effect ($F(2,597)=5.52, p=0.005$), which was explained by the difference in improvement between the control group and participants in the intervention group who completed at least three modules ($t(592)=-3.24, p=0.001$). The latter improved 1.81 on suicidal thoughts per time unit compared to 0.74 in the control group. There was no difference between the control group and participants in the intervention group who completed one or two modules ($t(601)=-0.91, p=0.362$). See figure 3.

Figure 2. Effect on suicidal thoughts for control group and intervention group.

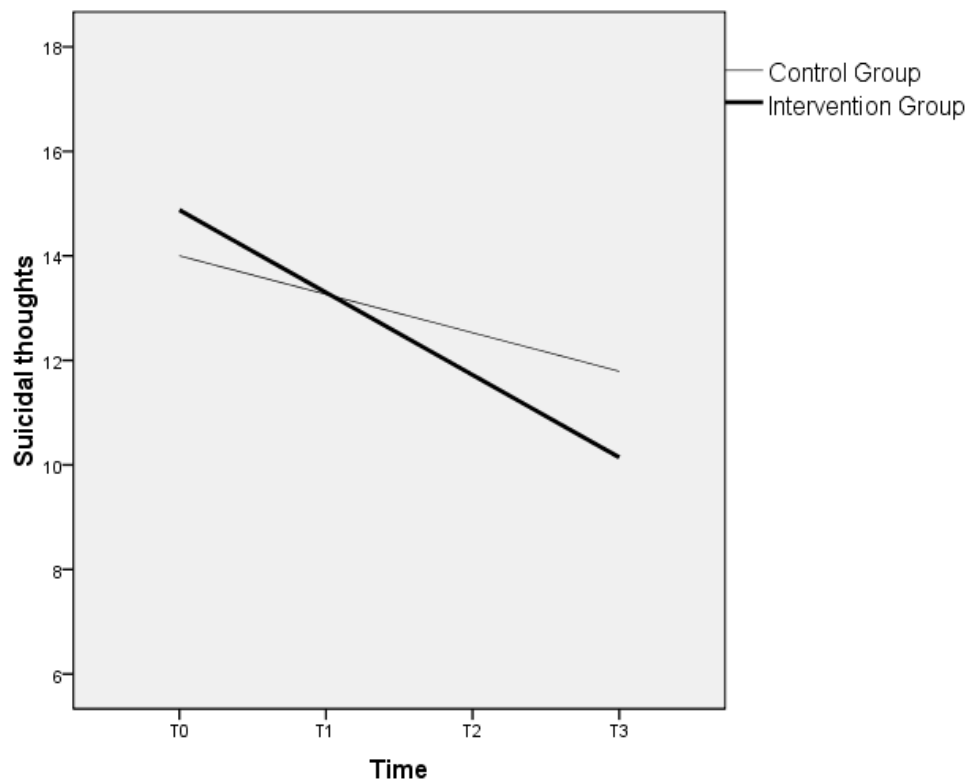
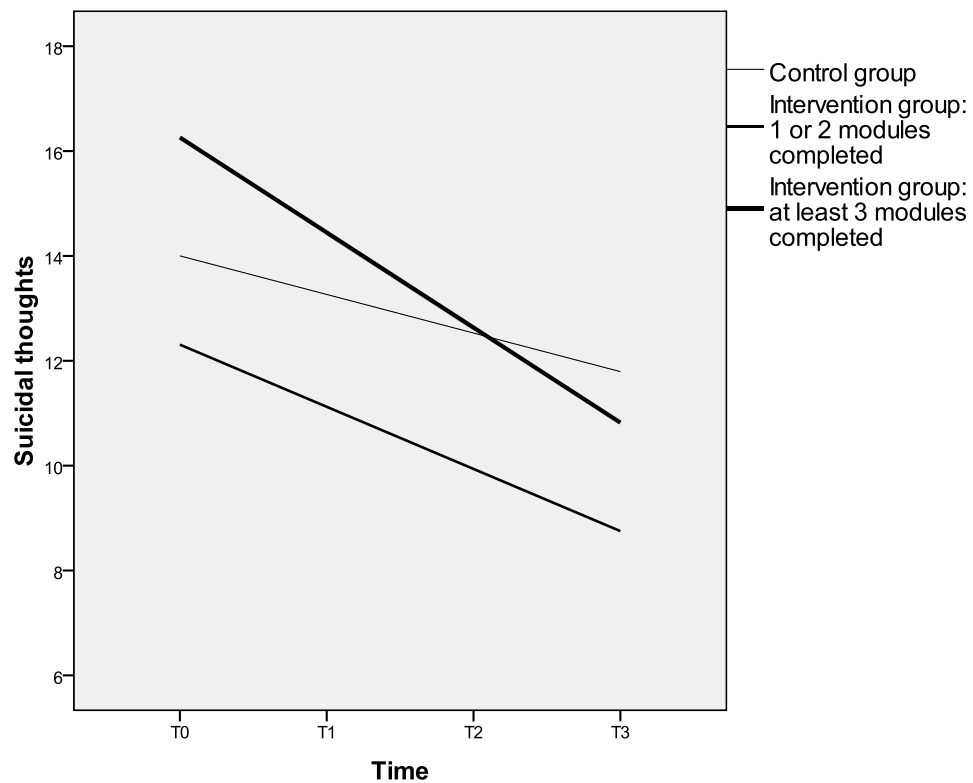


Figure 3. Effect on suicidal thoughts for control group, participants in the intervention group who completed 1 or 2 modules, and participants in the intervention group who completed at least 3 modules.



Safety procedure

During the study, participants who exceeded the cut-offs on the BSS and/or the BDI were called. Participants in the control condition were called more often than participants in the intervention condition (N=31 vs. N=19), with the difference showing a trend towards significance ($\chi^2(1)=3.16, p=0.076$). In a number of cases, the GP was called because of high risk (N=9 in the control group and N=3 in the intervention group; $\chi^2(1)=2.95, p=0.086$).

Based on self-report, eleven participants attempted suicide, of which seven were in the control group and four were in the intervention group ($\chi^2(1)=0.87, p=0.351$). No completed suicides occurred during the study.

Discussion

This RCT found a two-fold reduction in suicidal thoughts for web-based self-help subjects compared with waitlist controls, and this effect seems more pronounced in participants who completed at least three modules of the intervention. The intervention participants also improved significantly in hopelessness, worry and health status.

As this is the first study of web-based self-help for suicidal thoughts, the results cannot be compared directly to previous studies. However, the results accord with what may be expected based on previous results for face-to-face cognitive therapy for suicidality (Brown, et al., 2005; Tarrier, et al., 2008), and for unguided web-based treatment for related disorders (Andersson & Cuijpers, 2009). Although unguided programs generally demonstrate lower effect sizes than guided ones (Andersson & Cuijpers, 2009), the unguided nature of this intervention was integral to the study. The rationale for this decision was based on facilitating implementation and dissemination processes in both developed and developing countries. However, when means are available, guidance could be potentially provided.

In general, this study addresses the need for intervention studies in the field of suicidology (Huisman, Pirkis, & Robinson, 2010) and shows that online research with

a suicidal population is feasible, despite practical, methodological, and ethical issues. Moreover, it demonstrates that there is substantial interest in web-based self-help for suicidal thoughts, and that it meets the needs of suicidal people.

A design incorporating a safety procedure in which participants at risk were contacted and GPs were involved was an ethical condition for this trial. Also, the exclusion of severe suicidality and severe depression were part of the safety precautions. In hindsight, it is noteworthy that the majority of people who were excluded had severe depressive symptoms (83.3% of ineligible respondents), but less severe suicidal thoughts. In future similar trials, it might be worth considering broader inclusion of this group as well, as they would appear to be a motivated subset of the population in need of help. In contrast, relatively few severe suicidal respondents were excluded, indicating that the study sample represents a fair share of the suicidal population. We would recommend that future trials replicate this level of exclusion regarding suicidal thoughts, because they are likely to need more intensive care than online self-help is able to provide.

A limitation of this study is that many eligible respondents declined participation (32.9%), for which lack of anonymity is likely to have been important. It may thus be argued that the sample differed from the target population (i.e. people with suicidal thoughts who do not yet receive help), which may limit the generalisability of the results. Exclusion of people with severe depressive symptoms and severe suicidality also limits generalisability of the results. Furthermore, the fact that people who dropped out felt more hopeless at baseline may have influenced results - greater hopelessness is associated with greater attrition (Westra, Dozois, & Boardman, 2002). A final limitation is that no formal psychiatric diagnoses were available, as no diagnostic instrument was administered. Rationale for this transdiagnostic approach lies in the fact that suicidality, the primary target of the intervention, can be present in different psychiatric disorders, which has led Oquenda et al. (Oquendo, Baca-Garcia, Mann, & Giner, 2008) to suggest it being included as a separate axis in the DSM-V. This approach is also in line with the implementation goal of the intervention, that it should become available to people with suicidal thoughts in general, irrespective of the presence of a diagnosed disorder.

Evidently, this trial's results need to be confirmed in future studies. Moreover, web-based interventions are no substitute for face-to-face treatment. However, web-based help can reach people who do not seek or receive adequate care due to attitudinal barriers such as low perceived treatment efficacy or stigma, or due to geopolitical barriers when living in a region where (face-to-face) mental health care is less available or accessible. Although this study's effect size was small, the worldwide reach of the web and the low costs of unguided web-based self-help could enable it to contribute appreciably to suicide prevention.

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Chapter 7

Online Self-Help for Suicidal Thoughts: 3-Month Follow-Up Results and Participant Evaluation

Submitted as:

van Spijker, B.A.J., van Straten, A. & Kerkhof, A.F.J.M. Online Self-Help for Suicidal Thoughts: 3-Month Follow-Up Results and Participant Evaluation.

Abstract

Background

As a substantial proportion of people with suicidal thoughts does not receive treatment, the Internet can be utilised to reach more people who need support.

Aims

To examine maintenance of effects of online self-help for suicidal thoughts at follow-up within the intervention group of a randomised controlled trial, and to investigate acceptability through participant evaluation.

Methods

236 adults with mild to moderate suicidal thoughts were randomised to the intervention (n=116) or a waitlist control group (n=120). Assessments took place at baseline, post-test (6 weeks later), and follow-up (3 months after post-test).

Results

Effects detected at posttest were generally maintained at three-month follow-up. Participant evaluation revealed that a majority thought their suicidal thoughts had decreased during the study, that adherence to the intervention was below average, and that levels of satisfaction were acceptable.

Limitations

The control group could not serve as a comparator as they had received access to the intervention at post-test.

Conclusions

Effects of online self-help for suicidal thoughts can be maintained for up to three months. Participant evaluation indicated that online self-help for suicidal thoughts is acceptable, but that there is room for improvement. Overall, the outcomes are promising and mark an important step for online suicide prevention.

Introduction

The Internet is increasingly used to provide interventions in mental healthcare. Effectiveness studies of web-based interventions for mental health problems such as depression, anxiety and problem drinking have shown good results (e.g. Andersson & Cuijpers, 2009; Andrews, Cuijpers, Craske, McEnvoy, & Titov, 2010; Cuijpers, et al., 2009; Riper, et al., 2008).

In the field of suicide prevention, there is growing interest in online suicide-related communications and content (e.g. Kemp & Collings, 2011), and prevention efforts (e.g. Barak, 2007; Mokkenstorm, Stut, & Bakker, 2010). As a substantial portion of people with suicidal thoughts does not receive treatment (Bruffaerts, et al., 2011), it is a promising means to reach more people. Still, very few effectiveness studies have been conducted in online suicide prevention (Luxton, June, & Kinn, 2011; Pietrzak & McLaughlin, 2009).

A recently conducted randomised controlled trial (RCT) found significant effects in favor of online self-help for people with suicidal thoughts compared with a waitlist control group. Between-group effect sizes (Cohen's *d*) were 0.28 for suicidal thoughts and hopelessness, 0.34 for worry, and 0.26 for health status (van Spijker, van Straten, & Kerkhof, submitted). The aim of this paper is to determine whether the improvements at posttest of this trial were maintained at three-month follow-up for the intervention group. In general, benefits of web-based treatments for depression and anxiety seem to be maintained at follow-up (Andrews, et al., 2010). In line with this, it is expected that the results of the current trial will persist at follow-up. In addition, results of participant evaluation of the intervention are presented in this paper. These may provide insight into utilisation, reasons for non-adherence, perceived helpfulness, and satisfaction of online self-help for suicidal thoughts. Moreover, it may indicate potential areas for improvement.

Methods

Full details of the methodology of this study have been described elsewhere (van Spijker, van Straten, & Kerkhof, 2010). Here, elements relevant to the follow-up results and evaluation of the intervention are described.

Procedure

Recruitment from the general population took place between October 2009 and November 2010. To recruit participants, different media were used, such as advertisements in newspapers, on websites (e.g. www.113online.nl), and via Google Adwords.

Eligibility was assessed using an online stepwise screening procedure. Ineligibility at any stage resulted in automatic redirection to a page with referral information. Exclusion criteria were 1) being under the age of 18, 2) having no suicidal thoughts, 3) having excessive suicidal thoughts, 4) being severely depressed, 5) not being fluent in Dutch, and 6) not filling in a valid email address. To determine presence and severity of suicidal thoughts (criteria 2 and 3), the Beck Scale for Suicide Ideation (BSS) was used (Beck & Steer, 1991). Respondents scoring below 1 (no suicidal thoughts) or above 26 (severe suicidal thoughts) were excluded. The criterion for severe depression was a score above 39 on the Beck Depression Inventory (BDI-II) (van der Does, 2002). These cut-off scores were determined in consultation with clinical experts.

After being deemed eligible, participants read information about the trial, filled in the baseline questionnaire, and provided written informed consent along with personal contact details and those of their general practitioner. Participants were then randomised by an independent researcher using a block design (20 per block), and stratified by gender. Randomisation outcome was communicated by e-mail. The intervention group received a link and login codes for the intervention website, and the control group was provided with a link to a website constructed for this study containing general information on suicidality. Six weeks after randomisation,

participants in the control group also received access to the intervention website. No comparison can thus be made between the control and intervention groups regarding the follow-up results.

Because this study was conducted in a vulnerable population, safety procedures were employed (see van Spijker, et al., 2010 for full details of these procedures). The study was approved by the Medical Ethics Committee of the VU University Medical Centre (registration number 2008/204).

Intervention

The main goal of the intervention was helping participants decrease the frequency and intensity of their suicidal thoughts, thereby making these thoughts more controllable. In order to help participants achieve this, the intervention utilised cognitive techniques. The core of this unguided self-help intervention was Cognitive Behavioural Therapy (CBT) (Beck, 2005). In addition, components of Dialectical Behavioural Therapy (DBT) (Linehan, 1993a, 1993b), Problem Solving Therapy (PST) (Townsend, et al., 2001), and Mindfulness Based Cognitive Therapy (MBCT) (Segal, Williams, & Teasdale, 2002; Williams & Swales, 2004) were used. These treatment programs have been found to be effective in reducing suicidality (Brown, et al., 2005; Hawton, et al., 1999; Linehan, et al., 2006; Tarrier, Taylor, & Gooding, 2008; Williams, Duggan, Crane, & Fennell, 2006).

The intervention consisted of six modules. Each contained a theory section with background information and several essential exercises. In addition, a number of optional exercises were provided in each module. In the first module, the often repetitive character of suicidal thoughts was illustrated (Kerkhof & van Spijker, 2011). Exercises such as ‘worry time’ (i.e. scheduling discrete times throughout the day to worry about problems/suicidality) were designed to help participants manage their suicidal thoughts better. The second module aimed at providing tools to regulate intense emotion, e.g. participants were encouraged to create a crisis plan. Modules 3 to 5 contained basic cognitive exercises, in which participants consecutively worked on identifying automatic thoughts, learned to recognise thinking patterns and practiced reformulating negative automatic thoughts. In the final module, participants

were encouraged to create a relapse prevention plan and think about how to deal with possible future setbacks.

Participants were encouraged to follow one module per week and received a weekly automated motivating e-mail. Three exemplifying vignettes were included for participants to consult when needed. Finally, although no structural guidance was offered, participants were able to ask questions via the website (and had them answered).

Measures

The primary outcome measure in this study was suicidal thoughts. Secondary outcomes were depressive symptoms, hopelessness, worry, anxiety, and health status. All outcomes were assessed at baseline, at posttest (six weeks after baseline), and at follow-up (three months after posttest). All measures were self-report and administered via the Internet.

Suicidal thoughts were measured by means of the BSS (Beck & Steer, 1991). The BSS consists of 21 items, each scored on a 0-2 scale. Total scores range from 0 to 38, and are obtained by adding items 1-19. The last two items deal with suicide attempts and the intent to die during the most recent attempt. Internal reliability of the BSS is high, with Cronbach alpha ranging from 0.87 to 0.97 (Brown, 2001). Severity of depressive symptoms was assessed using the BDI-II (van der Does, 2002), which contains 21 items and has a total score range of 0 to 63. Internal consistency is good (Cronbach alpha 0.88-0.93) (van der Does, 2002). The Beck Hopelessness (BHS) scale was administered to assess hopelessness. This scale consists of 20 true/false statements, each scored 0 or 1, which add up to a total score between 0 and 20. Kuder-Richardson reliability lies between 0.87 and 0.93 (Brown, 2001). Worry was assessed using the Penn State Worry Questionnaire – Past Week (PSWQ-PW), which is a 15-item scale. Responses can range from ‘never’ (0) to ‘almost always’ (6), yielding a total score of 0 to 90. Average Cronbach alpha for this scale is 0.91 (Stöber & Bittencourt, 1998). The anxiety subscale of the Hospital Anxiety and Depression Scale (HADS-A) was used to assess anxiety symptoms (Bjelland, Dahl, Haug, & Neckelmann, 2002). Each of the 7 items is rated on a 4-point scale (0-3) so that total

scores range from 0 to 21. Cronbach alpha varies between 0.80-0.84 (Spinoven, et al., 1997). Health status was measured using the thermometer item of the EuroQol (Brooks, 1996). Respondents rate their current health status on this thermometer, ranging from 0 (worst imaginable health status) to 100 (best imaginable health status).

Finally, a number of questions regarding the use of, and satisfaction with, the intervention were administered at follow-up, as both groups had been granted access to the intervention by this time. These questions related to number of modules completed, time spent on the intervention, reasons for discontinuing the intervention, subjective improvement in suicidal thoughts, helpful and less helpful elements of the intervention, general satisfaction (expressed on a 1-10 scale), and suggestions for improvement.

Statistical analyses

As the control group received access to the intervention website at posttest, this group was not included in the analyses of follow-up results. Also results of the participant evaluation regarding ‘utilisation of the intervention’ and ‘reasons for drop out from the intervention’ are reported only for the intervention group, as these were not relevant for the control group. Conversely, for the sections ‘perceived helpfulness’ and ‘suggestions for improvement’, responses from all participants were analyzed so that all opinions expressed about the intervention were captured.

To test whether effects detected at posttest in the intervention group were maintained at follow-up, missing values at posttest (N=11, 9.5%) and at follow-up (N=14, 12.1%) were replaced using multiple imputation. Next, paired samples t-tests were conducted and within-group effect sizes were calculated according to Cohen’s d.

For the analyses of the evaluation (administered at follow-up), missing values were not imputed as variables were mainly categorical or open-ended. Instead, these participants were omitted from the analyses. Open-ended questions were numerically coded. If responses pertained to more than one category, these were coded separately. In general, analyses consisted of simple counts.

In one of the continuous variables ('time spent on intervention'), four outliers were detected and replaced by the mean value plus two standard deviations. All analyses were done using SPSS 17.0

Results

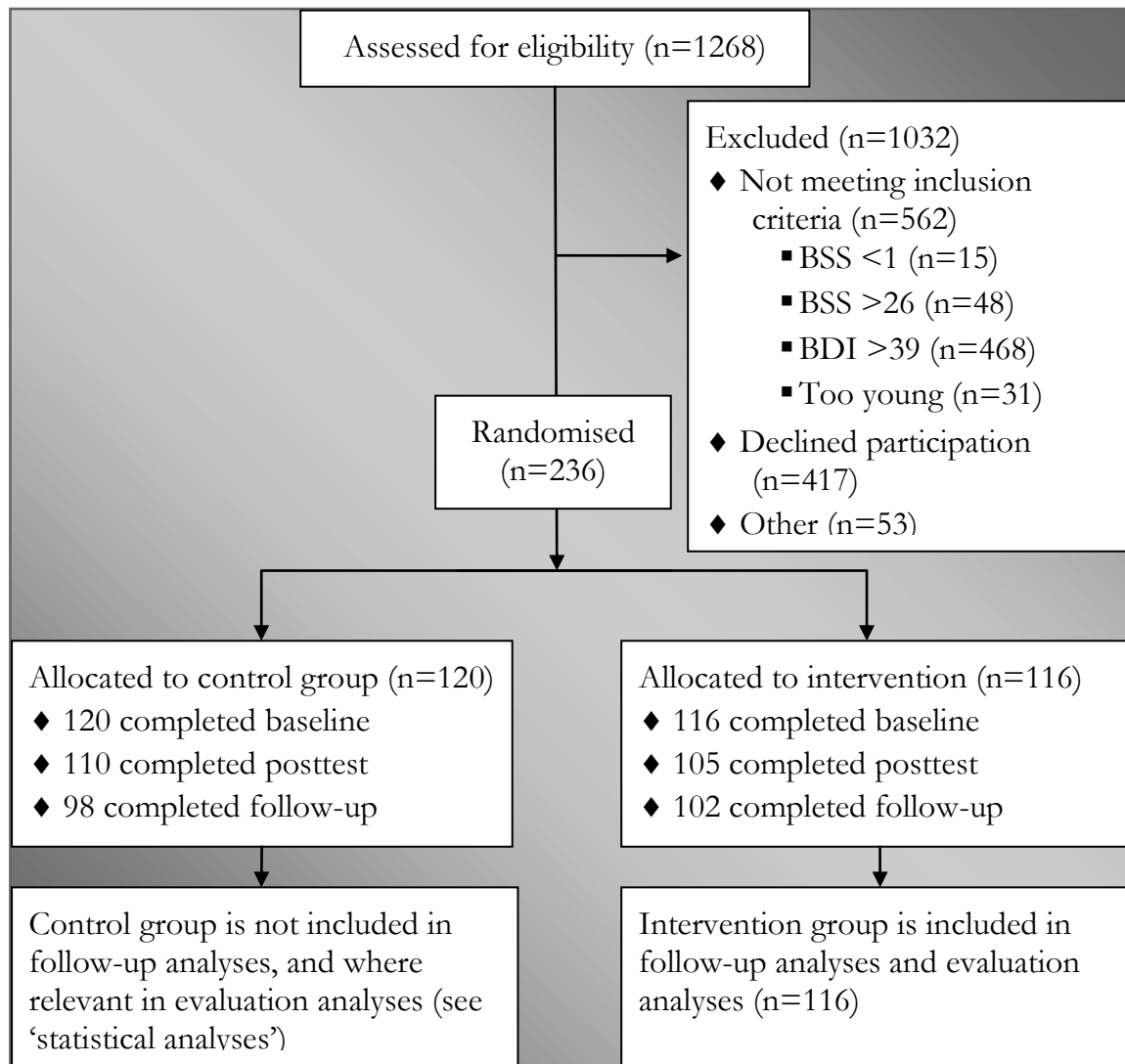
Participants

Of the 1,268 respondents who were assessed for eligibility, about half (N=706, 55.7%) was considered eligible. However, a substantial portion did not return their informed consent (N=417, 59.1%) or failed to provide a valid e-mail address (N=53, 7.5%). The remaining 236 were randomised to the control condition (N=120) or the intervention condition (N=116). See figure 1.

Baseline characteristics for the intervention group are provided in table 1. The mean age in this group was 40.5 years. The majority was female (N=76, 65.5%), born in the Netherlands (N=107, 94.7%), and had completed at least secondary school, if not additional vocational training (N=60, 51.7%). About half the intervention group was in paid employment (N=57, 50.4%). About a third was living with a partner (N=41, 35.3%), and/or had children (N=37, 32.7%).

Table 1. Baseline characteristics for intervention group

	Total (N=116)
Demographic characteristics	
Female gender (N, %)	76 (65.5)
Age (M, SD)	40.5 (14.1)
Education (N, %)	
Lower	11 (9.5)
Intermediate	60 (51.7)
Higher	39 (33.9)
Other	6 (5.2)
Living with a partner (N, %)	41 (35.3)
Has children (N, %) ¹	37 (32.7)
Born in the Netherlands (N, %) ¹	107 (94.7)
Paid employment (N, %) ¹	57 (50.4)
Clinical characteristics	
Suicidal thoughts (M, SD)	15.2 (6.8)
Attempted suicide (N, %) ¹	
Never	64 (56.6)
Once	19 (16.8)
More than once	30 (26.5)
Depressive symptoms (M, SD)	27.6 (9.3)
Hopelessness (M, SD) ¹	14.7 (3.6)
Worry (M, SD) ¹	58.8 (10.9)
Anxiety (M, SD) ¹	10.6 (3.5)
Health status (M, SD) ¹	60.0 (17.8)
¹ Missing: N=3	

Figure 1. Participant flow-chart.

Follow-up results

Paired samples t-tests showed that the intervention group improved significantly between baseline and posttest in suicidal thoughts ($d=0.56$), depressive symptoms ($d=0.41$), hopelessness ($d=0.43$), worry ($d=0.53$), and anxiety ($d=0.26$). Between posttest and follow-up, within-group effects were generally maintained for suicidal thoughts ($d=0.04$), hopelessness ($d=0.12$), worry ($d=0.03$), anxiety ($d=0.16$), and health status ($d=0.03$). For depressive symptoms, a significant further improvement between posttest and follow-up was detected ($d=0.26$). See table 2. Based on self-report, four participants in the intervention group and seven in the control group attempted suicide during the study. No completed suicides occurred.

Table 2. Follow-up results for the intervention group (N=116).

	Baseline (M, SD)	Post-test (M, SD)	ΔM^1 (SD)	d^1	Follow-up (M, SD)	ΔM^2 (SD)	d^2
Suicidal thoughts	15.2 (6.8)	10.6 (9.2)	-4.6 (8.2)**	0.56	10.3 (9.8)	10.3 (9.8)	0.04
Depressive symptoms	27.6 (9.3)	23.5 (13.1)	-4.1 (10.1)**	0.41	20.6 (14.3)	20.6 (14.3)	0.26
Hopelessness	14.7 (3.6)	12.6 (5.6)	-2.1 (4.9)**	0.43	11.9 (6.0)	11.9 (6.0)	0.12
Worry	58.9 (11.2)	53.2 (13.9)	-5.7 (10.7)**	0.53	53.7 (14.8)	53.7 (14.8)	0.03
Anxiety	10.6 (3.6)	9.6 (4.3)	-1.0 (4.1)*	0.26	9.0 (4.0)	9.0 (4.0)	0.16
Health status	60.2 (18.1)	62.7 (21.2)	2.5 (20.9)	0.12	62.0 (19.8)	62.0 (19.8)	0.03

¹ Within-group results regarding baseline to posttest.² Within-group results regarding posttest to follow-up.* $p < 0.01$ ** $p < 0.001$

Evaluation**Table 3.** Utilisation of intervention

	Intervention group
<i>Utilisation of intervention</i>	Completed (N, %):
	At least 1 module
	At least 3 modules
	All modules
On average, participants	Hours spent on intervention (M, SD) ¹
reported spending 10.5	Logged in after 6 weeks (N, %) ²
hours on the intervention,	No
which equals 1.8 hours per	Yes, I needed more time to finish
week (i.e. per module), or	the intervention
15 minutes per day. At	Yes, when I needed it
posttest, 21.6% of	

¹Missing: N=24; ²Missing: N=17

participants in the intervention group (N=25) had completed all modules (see van Spijker, et al., submitted). Data from the evaluation indicate that this percentage increased to 31.0 (N=36) at follow-up. A majority of participants in the intervention group (N=80, 80.8%) indicated not to have revisited the intervention website after the six-week intervention period. A minority indicated that they had needed more time to finish the intervention and therefore accessed the website after the six-week intervention period (N=10, 10.1%). A similar percentage logged in after the intervention period when they felt they needed it (N=9, 9.1%). See table 3.

Reasons for drop out from intervention

Among the 80 participants in the intervention group who indicated not to have completed the intervention, the most reported reasons for non-adherence were lack of energy or discipline (N=8, 10.0%) and lack of time (N=5, 6.3%). Four participants (5.0%) reported no further need for treatment due to recovery of symptoms. Three people (3.8%) indicated that they had commenced psychological treatment elsewhere. Illness (N=1, 1.3%) and admission to a psychiatric hospital (N=2, 2.5%) during the intervention period were also among the reasons for non-adherence. Another two participants (2.5%) discontinued the intervention due to it influencing them negatively. One of them reported that the intervention triggered a depressive episode, and the other stated that the first three modules did not contain new information,

which resulted in disappointment and decreased faith in the potential to recover. Other reasons for not completing the intervention (N=12, 15.0%) included not having noticed the e-mail with the login codes, and not finding the intervention relevant to one's situation. The remaining 43 (53.8%) did not provide any reason for discontinuing the intervention.

Perceived helpfulness and appreciation of intervention elements

A question concerning the subjective change in suicidal thoughts during the study period showed that the majority of the total sample (N=236) indicated that their suicidal thoughts became less troubling (N=70, 36.8%) or a lot less troubling (N=57, 30.0%). About a third reported no change (N=57, 30.0%), and a small number of participants indicated that their suicidal thoughts troubled them more (N=6, 3.2%). Three of the individuals in this latter category reported having experienced a crisis, becoming more depressed after two modules, and finding the intervention “emotionally difficult” respectively. The other three did not provide further information. These six participants did not include the two that had reported a negative influence of the intervention as a reason for drop-out as they both indicated that their suicidal thoughts troubled them less.

Elements most reported as helpful or appreciated were cognitive techniques used in the intervention, such as recognizing automatic thoughts and thinking patterns, reformulating negative automatic thoughts, and positive thinking exercises (N=30, 17.5%). A number of comments were less specific and reported having appreciated the theory and/or exercises in general (N=28, 16.4%), while several pertained specifically to appreciating the worry time exercise (N=16, 9.4%). A further 14 (8.2%) comments indicated that making a crisis plan was helpful and important. A quarter of the positive comments (N=41, 24.0%) related to other elements of the intervention, such as the section on dealing with future setbacks and the encouragement to call a helpline. Included in this category are also comments that relate more to the study than to the intervention, such as filling in questionnaires. Another 34 responses (19.9%) indicated no strong opinions or preferences. See also table 4.

Responses pertaining to less helpful or less appreciated elements of the intervention revealed that the exemplifying vignettes were most reported as such (N=15, 10.8%). A similar number indicated that the intervention did not contain new information and/or exercises (N=12, 8.6%), often due to previous experiences with treatment. A few reported a need for feedback or guidance (N=6, 4.3%), and a similar number indicated that worry time was too heavy or required too much discipline (N=5, 3.6%). A large portion of comments (N=60, 43.2%) related to various other elements of the intervention (e.g. that the section on reformulating negative automatic thoughts was too extensive), or to the study in general (e.g. that the wording of several questions in the questionnaires was unclear). About a third did not list any elements as less helpful (N=41, 29.5%). See also table 4.

Table 4. Perceived helpfulness and appreciation of the intervention.

	Total responses
Components of intervention considered as helpful (N, %) ¹ :	
Theory and exercises regarding cognitive processes	30 (17.5)
Theory and/or exercises in general	28 (16.4)
Worry time (scheduled time to worry about problems/suicidality)	16 (9.4)
Dealing with intense feelings / making crisis plan	14 (8.2)
Openness about suicidality / clarity of theory	8 (4.7)
Other	41 (24.0)
Don't know / not applicable	34 (19.9)
Components of intervention considered as less helpful (N, %) ² :	
Exemplifying vignettes	15 (10.8)
Materials (theory and exercises) were not new	12 (8.6)
Lack of feedback / guidance	6 (4.3)
Worry time	5 (3.6)
Other	60 (43.2)
Don't know / not applicable	41 (29.5)
¹ Total number of responses is 171, provided by 120 participants.	
² Total number of responses is 139, provided by 113 participants.	

Suggestions for improvement

On a 1-10 scale, the majority of all participants (71.1%) rated the overall intervention above midpoint (>5.5), indicating that they were more satisfied than not. When asked what should be improved to increase this rating, provision of personal feedback or guidance was most commonly suggested ($N=16$, 12.7%). Eleven participants (8.7%) advised tailoring the intervention to individual needs. A similar number ($N=10$, 7.9%) indicated the intervention needed no changes. Nine participants (7.1%) indicated there was too much material and/or more time was needed per module (i.e. more than the recommended one week per module). Conversely, a small number recommended greater elaboration of the theory sections ($N=6$, 4.8%). The majority gave no suggestions ($N=43$, 34.1%), or made other, less frequent, recommendations ($N=28$, 22.2%) such as increasing attention to life events and adding more writing exercises. Included in this category were also suggestions to improve the questionnaires used in the study.

Discussion

This study sought to verify whether effects of online self-help for suicidal thoughts were maintained at three-month follow-up and presented participant evaluation in order to provide insight into the acceptability of the intervention. It was found that all effects detected at posttest were maintained at three-month follow-up. For depressive symptoms, a significant further improvement was demonstrated. Although no other studies into online self-help for suicidal thoughts have been conducted, and results can therefore not be directly compared, these results are in line with findings from previous studies concerning online self-help interventions for depression and anxiety (Andrews, et al., 2010). Overall, these outcomes are promising and mark an important step for online suicide prevention research.

Adherence to the intervention was below average. Where reviews of online depression trials have shown 50-87% adherence (Andrews, et al., 2010; Christensen, Griffiths, & Farrer, 2009), only 21.6% of participants in the intervention group had

completed all modules at posttest (see van Spijker, et al., submitted), which increased to 31.0% at follow-up. It should be noted here that measures of adherence vary across studies, which influences comparability. A possible explanation for low adherence in this trial lies in the absence of guidance, as poorer adherence has previously been reported in unguided web-based treatment trials (de Graaf, Huibers, Riper, Gerhards, & Arntz, 2009; Kenwright, Marks, Graham, Franses, & Mataix-Cols, 2005). In addition, elements inherent to the target population may play a role. For example, noncompliance has been reported as a barrier to treatment in people who attempt suicide (Lizardi & Stanley, 2010) and die by suicide (Huisman, Kerkhof, & Robben, 2011). However, this is not consistently reported (e.g. Sokero, et al., 2008) and might therefore be subject to specific patient groups. More specifically, the severity of symptoms in the current sample (see also van Spijker, et al., submitted) may have contributed to poorer adherence, as these have been linked in previous web-based intervention studies (Christensen, et al., 2009). Self-reported reasons for noncompliance in this study were generally in line with common reasons for intervention drop-out, which include lack of time, lack of motivation, and improvement in condition (Christensen, et al., 2009).

Participant evaluation showed that the majority (two thirds) of participants reported that their suicidal thoughts troubled them less over the course of the study. Although this was a subjective measure, it is a noteworthy result and in line with the aim of the intervention (i.e. making suicidal thoughts more manageable). Moreover, it corresponds with what may be expected in face-to-face treatments. Results regarding the perceived helpfulness and appreciation of the intervention were variable. For example, worry time was listed as a helpful element by some, whereas others regarded it as less helpful. Although this was anticipated by providing optional exercises in each module, tailoring the intervention to individual needs may increase benefits.

Overall, the majority (71.1%) of the sample was more satisfied than not with the intervention, which is in keeping with previously reported satisfactions levels of 70-100% (Andrews, et al., 2010). As with adherence, different measures may be used to assess satisfaction, which may limit comparability. Suggestions for improvement primarily showed a need for more guidance, which is in line with recent findings from a qualitative study on patient experiences in unguided self-help for depression

(Gerhards, et al., 2011). In general, the variety of suggestions for improvement further indicates that what works differs from person to person, thus supporting the argument for tailored intervention. Tailoring the intervention might entail participants being screened for ‘most urgent problem areas’ (e.g. controlling emotions, repetitive thinking, hopelessness, worthlessness, unlovability) and preferred therapeutic techniques (e.g. seeking distraction, mindfulness, cognitive restructuring, problem solving) upon registration. Subsequently, participants could be directed towards the most relevant module. Future research is required to inform this screening and direction process. While this approach would be time consuming, a more readily employed option to tailor the intervention would be to provide guidance (e.g. group-chat, private chat, e-mail, phone calls) and vary the frequency and intensity according to individual needs.

Strengths of this study pertain to it being the first to study online self-help for suicidal thoughts and the use of a randomised controlled design. Limitations include the fact that no follow-up data was available for the control group, as they gained access to the intervention at posttest. Although this was done in the interest of ethical conduct, it would be desirable to utilise a longer waiting period in future studies for the control group. A second limitation is the relatively high number of missing values in the evaluation data, which may bias results. Finally, a longer follow-up period would be beneficial in order to capture effects beyond three months.

In conclusion, this study has demonstrated that effects obtained for online self-help for suicidal thoughts can be maintained for up to three-months. Participant evaluation indicated that web-based self-help for suicidal thoughts is acceptable, but also that tailored intervention, with potential for personal feedback, could be beneficial. Future studies are needed to provide a better understanding of how the Internet and other social media could best be utilised to help this vulnerable group.

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Chapter 8

Reducing Suicidal Ideation via the Internet: Cost-effectiveness Analysis Alongside a Randomised Trial into Unguided Self-Help

Submitted as:

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Reducing Suicidal Ideation via the Internet: Cost-Effectiveness Analyses Alongside a
Randomised Trial into Unguided Self-Help.

Abstract

Context

Suicidal ideation is highly prevalent but often remains untreated. The Internet can be utilised to provide accessible interventions.

Objectives

To evaluate the cost-effectiveness of an online unguided self-help intervention for reducing suicidal ideation.

Design

Economic evaluation alongside a randomised controlled trial comparing online self-help (n=116) to a waitlisted information-only control condition (n=120). Participants in both groups had unrestricted access to care as usual.

Setting

Dutch general population.

Participants

Adults recruited in the general population with suicidal ideation, defined as scores between 1-26 on the Beck Scale for Suicide Ideation (BSS).

Intervention

Online unguided self-help aimed at decreasing the frequency and intensity of suicidal ideation, consisting of six weekly modules and based on cognitive behavioural techniques.

Main outcome measures

Treatment response was defined as a clinically significant decrease in suicidal ideation on the BSS. Total per-participant costs encompassed costs of health service uptake,

participants' out-of-pocket expenses, costs stemming from production losses, and intervention costs. These were expressed in Euros (€) for the reference year 2009.

Results

At post-test, treatment response was 35.3% and 20.8% in the experimental and control condition, respectively. The incremental effectiveness was $0.35 - 0.21 = 0.15$ (SE 0.06, $p=0.012$). The annualised incremental costs were -€5,039 per participant. Therefore, the mean incremental cost-effectiveness ratio (ICER) was estimated to be $- €5,039 / 0.15 = - €33,593$ (US\$39,606) for an additional treatment response, indicating annual cost savings per successfully treated participant.

Conclusions

This is the first trial worldwide indicating that online self-help to reduce suicidal ideation is feasible, effective and cost saving. Limitations included reliance on self-report and a short time-horizon of six weeks. Replication with longer follow-up period is therefore recommended.

Introduction

Suicidal ideation is highly prevalent and causes considerable disease burden (van Spijker, van Straten, Kerkhof, Hoeymans, & Smit, 2011), but often remains untreated (Bruffaerts, et al., 2011). Frequently reported barriers to seeking help include a preference to handle the problem alone, believing the problem is not severe, and believing treatment will not be effective (Bruffaerts, et al., 2011). For these reasons an online self-help intervention specifically aimed at reducing suicidal ideation was developed (van Spijker, van Straten, & Kerkhof, 2010). Self-help can be defined as a standardised psychological treatment that a participant can work through independently. The rationale for using online-delivery for this intervention included the reach, accessibility, and anonymity of the web, facilitating dissemination. Web-based interventions have been found effective for a range of mental disorders, e.g. depression, anxiety, and problem drinking (Andersson & Cuijpers, 2009; Andrews, Cuijpers, Craske, McEnvoy, & Titov, 2010; Cuijpers, et al., 2009; Riper, et al., 2008).

The potential economic advantages of web-based interventions are among commonly cited motivations for their development (Tate, Finkelstein, Khavjou, & Gustafson, 2009). Indeed, promising results have been published for web-based interventions targeting both somatic (Andersson, et al., 2011; Kaldø, Levin, Widdersson, & Buhrman, 2008) and psychological problems (Cunningham, Khadjesari, Bewick, & Riper, 2010; Gerhards, et al., 2011; McCrone, et al., 2004; Mihalopoulos, et al., 2005; Warmerdam, Smit, van Straten, Riper, & Cuijpers, 2010). However, being a relatively young research field, economic evaluations of web-based interventions are still scarce and often have considerable limitations (Tate, et al., 2009).

With respect to face-to-face psychological treatments targeting suicidality, some empirical evidence is available for Cognitive Behaviour Therapy (CBT) (Tarrier, Taylor, & Gooding, 2008; Wenzel, Brown, & Beck, 2009), Dialectical Behaviour Therapy (DBT) (Linehan, et al., 2006; van den Bosch, Koeter, Stijnen, Verheul, & van den Brink, 2005; Verheul, et al., 2003), Problem Solving Treatment (PST) (Hawton, et al., 1999; Townsend, et al., 2001), and Mindfulness Based Cognitive Therapy (MBCT) (Barnhofer, et al., 2009; Williams, Duggan, Crane, & Fennell, 2006; Williams

& Swales, 2004). Economic evaluations of psychological treatments for suicidality are almost non-existent, which has been attributed to a general lack of unambiguous effectiveness of treatment programs (Leitner, Barr, & Hobby, 2008; McDaid & Kennelly, 2009). One study comparing Manual Assisted Cognitive Behaviour Therapy (MACT) with care as usual found indications that MACT was valuable from an economic perspective. However, results were not conclusive (Byford, et al., 2003). Furthermore, a review into therapies for borderline personality disorder indicated that DBT could potentially be cost-effective (Brazier, et al., 2006).

The economic impact on society of not taking preventive measures, i.e. the costs of suicide, have been estimated to be well over one million British Pounds per suicide (2005 prices) (see McDaid & Kennelly, 2009). Although no similar estimates have been reported regarding suicidal ideation, these are likely to be substantial when considering the economic burden of depression (e.g. Donohue & Pincus, 2007; Sobocki, Jönsson, Angst, & Rehnberg, 2006), which is a common mental disorder in people with suicidal ideation.

This paper reports the results of an economic evaluation alongside a randomised controlled trial comparing online self-help for suicidal ideation with a waitlist control condition.

Methods

Design and participants

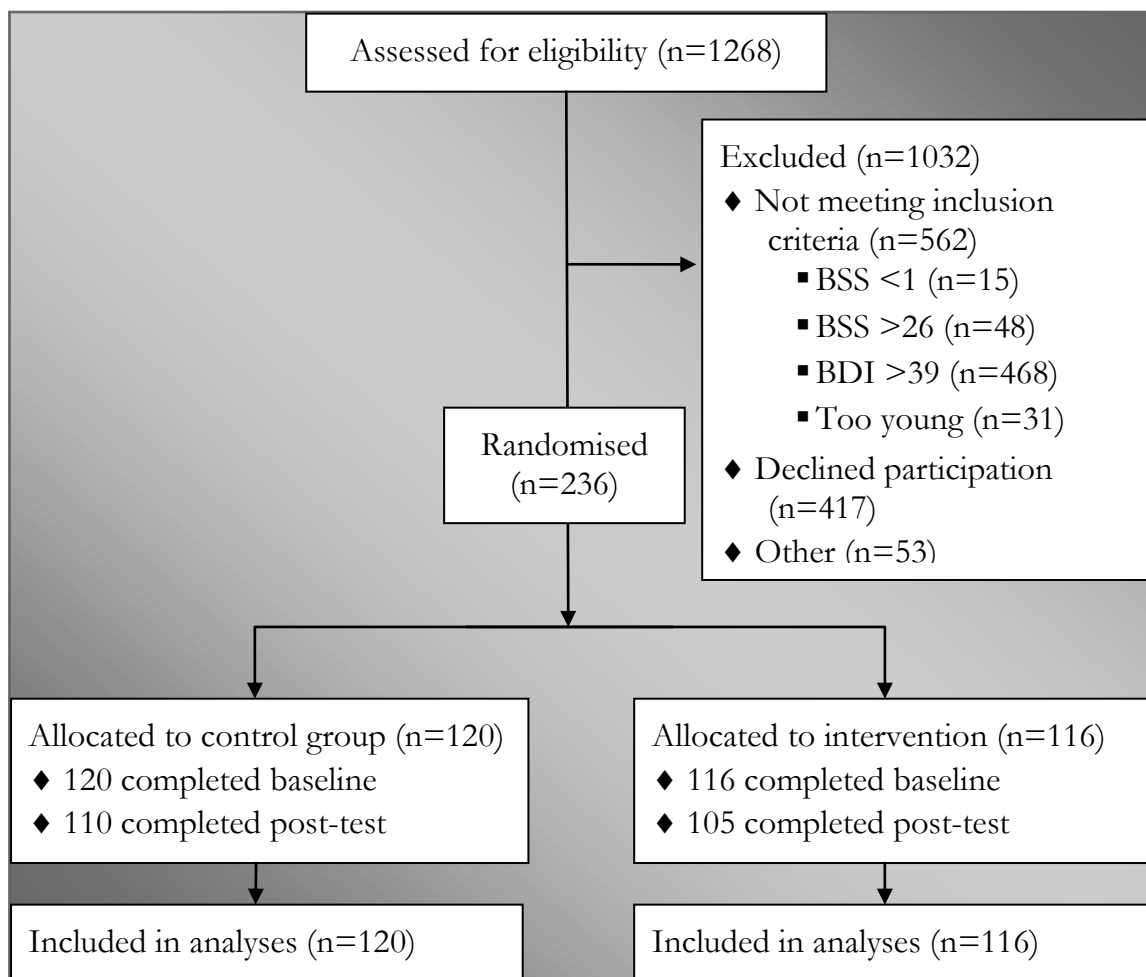
Participants were recruited from the general population by means of advertisements in newspapers, relevant websites (e.g. www.113Online.nl), and Google Adwords. The methods used in this trial have been described in detail elsewhere (van Spijker, et al., 2010). To be included, people had to be over 18 years of age, have access to the Internet and a valid e-mail address, and have a good command of the Dutch language. In addition, they needed to present with a score between 1 and 26 on the Beck Scale for Suicide Ideation (BSS) (Beck & Steer, 1991) suggesting mild to moderate suicidal ideation, and a score below 40 on the Beck Depression Inventory (BDI) (van der

Does, 2002), to avoid including people with overly severe levels of depression. These criteria were established in consultation with clinical experts.

Eligibility was assessed using an online application procedure. In total, 1,268 respondents filled in the screening questionnaires (BSS & BDI). Respondents who exceeded the cut-off scores ($n=562$) were referred to other (mental health) services by means of an automated response. Eligible respondents were requested to fill in their e-mail address, after which an information brochure and an informed consent form were e-mailed. A small number did not fill in their email address and was consequently excluded ($n=53$). After returning the informed consent form, on which participants had to disclose their identity and that of their General Practitioner (GP), participants ($n=236$) were stratified for gender and randomised in blocks of size 20 to the intervention ($n=116$) or the waitlisted information control condition ($n=120$) by an independent researcher. The majority of eligible respondents ($n=417$, 59.1%) did not return their informed consent form, possibly due to the lack of anonymity when participating (see Figure 1).

After randomisation, participants in the intervention group received login codes for the self-help intervention. Participants in the control group received a link to an information website and were informed that they would receive access codes to the intervention six weeks later. It is worth noting that all participants, in both conditions, had unrestricted access to care as usual (CAU) and were encouraged to make use of this.

Because this study was conducted in a vulnerable population, safety procedures were employed. Each time a participant in either condition exceeded cut-off scores on suicidal ideation or depressive symptoms, a risk assessment was carried out over the phone. If necessary, or if a participant could not be reached, their GP was contacted (see van Spijker, et al., 2010). The study was approved by the Medical Ethics Committee of the VU University Medical Centre (registration number 2008/204).

Figure 1. Flowchart of participants in the trial.

Intervention

The experimental group received an online unguided self-help intervention aimed at decreasing the frequency and intensity of their suicidal ideation. This intervention is based on CBT (DBT, PST, and MBCT). All these treatment programs have evidence for their effectiveness in reducing suicidality (see e.g. Brown, et al., 2005; Chang, Stanley, Brown, & Cunningham, 2011; Linehan, et al., 2006; Williams, et al., 2006).

The intervention consists of six weekly modules which consecutively focus on 1) the repetitive character of suicidal thoughts, 2) dealing with intense emotions, 3) identifying negative automatic thoughts, 4) learning to recognise thinking patterns, 5) reformulating negative thoughts, and 6) relapse prevention.

Participants were encouraged to follow one module per week and received a weekly automated motivating e-mail. If desired, participants were able to ask

questions pertaining to the intervention via the website. These were answered by the researchers, taking an average of 6 minutes per participant over the entire intervention period. A more detailed description of the intervention has been provided in the study protocol (van Spijker, et al., 2010).

The control group received a link to a website created for the study which provided information on suicidality such as prevalence, warning signs, and risk factors. Pretesting indicated that a maximum of 15 minutes was needed to read this information. In addition, links to relevant mental health centers were provided and participants were advised to utilise these.

Outcome measures

Questionnaires were self-report and administered via the Internet. For the current paper, data from baseline and posttest (6 weeks after baseline) were used.

Primary clinical outcome

The primary clinical outcome in this paper is suicidal ideation, assessed using the BSS (Beck & Steer, 1991). This self-report questionnaire consists of 21 items, each scored on a 0-2 scale. The total score is obtained by adding items 1-19, and ranges from 0 to 38. The last two items relate to suicide attempts and the intent to die during the most recent attempt. Internal reliability of the BSS is high, with Cronbach alpha ranging between 0.87 and 0.97 (Brown, 2001). In this study the Cronbach alpha was 0.89 (at baseline).

Resource use and costing

In this study, a societal perspective was adopted and therefore the costs of health service uptake, patients' out-of-pocket costs, and production losses in paid work were included. Data on healthcare uptake and production losses were collected using the Trimbos and institute of Medical Technology Assessment Questionnaire for Costs associated with Psychiatric Illness (TIC-P), a health service receipt questionnaire that is widely used in economic evaluations in the Netherlands (Hakkaart-van Roijen, van Straten, Donker, & Tiemens, 2002). This produces three cost categories: direct

medical costs, direct non-medical costs, and indirect non-medical costs. Data were collected for two periods: the 6 weeks prior to baseline, and the 6 weeks following baseline.

Direct medical costs relate to the utilisation of healthcare services. To calculate these costs, health service units were multiplied by their standard full economic cost prices as reported in the Dutch guidelines (Hakkaart- van Roijen, Tan, & Bouwmans, 2010) for health economic evaluations for the reference year 2009 (see Table 1). The costs of prescription psychotropic drugs (antidepressants, benzodiazepines, and antipsychotics) were calculated as the price per standard daily dose as reported in the Dutch Pharmacotherapeutic Compass (College voor Zorgverzekeringen, 2009) multiplied by the number of prescription days, plus pharmacists' dispensing costs of €14 per prescription.

Direct non-medical costs encompassed participants' travel expenses to receive professional help and loss of leisure time, the latter valued at €12.50 per hour (Hakkaart- van Roijen, et al., 2010). Additionally, informal caregivers' (friends, neighbors, family) use of time, e.g. running errands for participants, was valued at €12.50 per hour (see Table 1).

Finally, the costs stemming from production losses in paid work (indirect non-medical costs) were calculated from the number of days absent from work (absenteeism), plus the number of days spent at work with reduced efficiency, corrected for degree of inefficiency (presenteeism). Table 2 reports the age-specific economic costs of each hour of lost productivity for men and women respectively.

The total associated costs (in Euros) can be converted to US dollars using the purchasing power parity (PPP) exchange rates reported by the OECD (www.oecd.org), which converts currency while taking into account the differential buying power across countries. For the reference year 2009, US\$1.00 was equivalent to €0.848173.

Table 1. Direct medical and direct non-medical costs by health type

Health service type	Direct medical costs (in 2009 €)			Direct non-medical costs (in 2009 €)	
	Unit	Unit cost price ^a		Km, hrs (h) ^b	Unit cost price ^c
General practitioner	Contact	28		1.1, 1h	15.7
Company doctor ^d	Contact	28		17.6, 0.5h	9.7
Social worker	Contact	65		5, 2h	29
Private practice psychotherapist, psychiatrist	Contact	90 ^e		7, 2h	29.4
Alcohol and drug consultant (CAD)	Contact	171		10 ^f , 3h	42.5
Regional mental health service	Contact	171		7, 3h	41.9
Physiotherapist	Contact	36		2.2, 2h	28.4
Mental hospital	Contact	173		7, 4h	54.4
Medical specialist general hospital	Contact	72		7, 3h	41.9
Alternative treatment ^g	Contact	50.7		5, 1h	16.5
Daycare, mental health treatment	Contact	154		7, 1h	54.4
Home care	Hour	35		NA	NA
Informal care (family, friends) ^h	Hour	12.5		NA	NA

^a Integral unit cost prices (cf. Hakaart-van Roijen et al. 2010).^b Based on average distances (in special tariff taxi and public transport zones) and travel + waiting + treatment times (in hrs) for receiving treatment (cf. Hakaart-van Roijen et al. 2010).^c Costs = $(0.2 * \text{km}) + 3 + (12.5 * \text{hrs})$. With €0.2 = cost per km; €3 = 1h parking time; €12.5 = 1h time (cf. Hakaart-van Roijen et al. 2010).^d No parking costs assumed.^e Own calculation, valued as average of private practice psychotherapist and psychiatrist (cf. Hakaart-van Roijen et al. 2010).^f Assumed as CAD were more dispersed than regional mental health services.^g Own calculation, valued as average of homeopath and acupuncturist (cf. Hakaart-van Roijen et al. 2010).^h Valued as domestic help (cf. Hakaart-van Roijen et al. 2010).

Note: NA=Not Applicable

Table 2. Productivity costs by gender and age
€, 2009^a

Age classes	Men	Women
15-19	9.65	8.76
20-24	17.75	17.18
25-29	24.19	23.62
30-34	29.65	27.54
35-39	34.03	29.25
40-44	36.67	29.06
45-49	38.32	28.91
50-54	39.06	29.25
55-59	39.38	29.50
60-64	39.13	28.67
65+	39.13	28.67

^a Costs are indexed from the Collective Labor Agreement, 2008 (2.8%).

Source: Hakkaart-van Roijen et al. (2010).

Per participant intervention costs

In estimating per-participant intervention costs, the average time spent on the intervention was valued at €12.50 per hour (leisure time value) for an average of 10.5 hours per participant over the 6-week intervention period. In addition, psychologist time spent answering questions was included for an average of 6 minutes per participant over the

course of the intervention (at €154/hour). Further costs were related to website maintenance, which amounted to €1,740 and €10,000 per annum for upgrading and hosting the website respectively.

Relying on data from a Dutch population survey on suicidality (NEMESIS-2; ten Have, van Dorsselaer, Tuithof, & de Graaf, 2011) and Statistics Netherlands (Statistics Netherlands, 2010), 91% of the Dutch adult population with suicidal ideation (N=180,000) has Internet access (N=163,800). Taking a conservative approach, it was assumed that 40% would search for online help, of whom a final 10% would engage in the online self-help intervention. This resulted in estimated usage by 6,552 participants per year.

Based on the above assumptions and data, the per-participant intervention costs were estimated to be €148 (US\$176).

Analysis

Statistical analyses

Analyses were carried out on an intention-to-treat basis. Therefore, all participants were analyzed in the condition to which they were, randomised and missing data at post-test for the BSS (n=21, 8.9%) were imputed using regression imputation as

implemented in Stata, with age, gender, employment status, education, relationship status, nationality, baseline clinical outcomes (suicidal ideation, depression, hopelessness, worry, anxiety) and randomisation status as predictor variables.

For suicidal ideation, reliable and clinically significant change was calculated to be 6.48 points on the BSS according to the Jacobson and Truax method (Jacobson & Truax, 1991). Participants were dichotomised according to this criterion into treatment responders and non-responders.

In addition to the primary clinical outcome, the use of the safety procedures is reported (in number of phone calls with participants who exceeded cutoff scores during the trial and referrals to GP), as well as number of suicide attempts.

Cost-effectiveness analyses

Missing cost data at post-test (between 1% and 18% depending on the type of costs) were imputed using similar regression imputation as for the BSS.

The mean total costs for each of the conditions were calculated at baseline and post-test. Since mean baseline costs were similar across both conditions (see Results), the incremental costs were calculated as the between-group difference at post-test. For reasons of comparability, annualised costs are presented.

Both incremental costs and incremental effects were used to calculate the incremental cost-effectiveness ratio (ICER). The ICER was calculated as $(C_1 - C_0) / (E_1 - E_0)$, where C is the average annual per participant cost and E is the proportion of treatment responders in the experimental and control conditions (subscripted 1 and 0 respectively). The ICER describes the incremental costs for gaining one additional treatment response (Langley, 1996; Siegel, et al., 1997; Torrance, et al., 1996). One additional treatment response is defined as one participant improving 6.48 points on the BSS.

Non-parametric bootstraps were used to simulate 2,500 ICERs that were plotted on the cost-effectiveness plane. In this way, the degree of uncertainty associated with the ICER is captured (van Hout, Al, Gordon, & Rutten, 1994). Each simulated ICER can potentially fall into one of the four quadrants of the ICER plane. The North-East (NE) quadrant represents superior health gains associated with the intervention, but at additional costs relative to routine care. This scenario is typically

encountered in economic evaluations: better health is obtained for additional costs. In the North-West (NW) quadrant health diminishes while costs increase. Clearly, this is the worst possible outcome, as the intervention is “dominated” by CAU. In the South-West (SW) quadrant health diminishes, but there are cost-savings. Finally, in the South-East (SE) quadrant the intervention generates superior health gains (relative to the comparator condition) and does so for lower costs; the intervention “dominates” the comparator condition, which is the best possible outcome.

Use of willingness to pay (WTP) estimates is another method for determining value for money. By assigning hypothetical maximum WTP amounts (ceilings), ranging from €0 to €100,000 per treatment responder, probability estimates for the acceptability of the intervention compared with CAU from a cost-effectiveness point of view, were calculated. The relationship between each assigned WTP ceiling and the probability that the new intervention is viewed as acceptable, can be plotted in an ICER acceptability curve.

Sensitivity analysis

The estimated per-participant intervention costs are surrounded by some uncertainty. To ascertain the robustness of the overall findings, all analyses were repeated for three alternative scenarios, encompassing 10, 20, or 30 minutes of additional guidance per participant, per module (i.e. 1, 2, and 3 hours, respectively, per participant during the intervention). These are relevant scenarios as guidance is often provided with web-based interventions. It was assumed that guidance would be provided by a clinical psychologist, and, conservatively, that more therapist time would not increase clinical effectiveness.

Results

Sample characteristics

Participants had a mean age of 40.9 (SD 13.7). The majority of the sample was female (N=156, 66.1%), and born in the Netherlands (N=218, 94.0%). About half of the

sample had completed high school or intermediate vocational training (N=112, 47.5%), and 38.1% (N=90) had completed higher vocational or academic training. A minority was living with a partner (N=95, 40.3%) and had children (n=87, 37.5%). Half of the sample was in paid employment (N=116, 50.0%). Mean score for suicidal ideation was 14.9 at baseline (SD=7.1). There were no significant differences in socio-demographic or clinical characteristics between the intervention and control groups, indicating that randomisation had resulted in comparable groups.

In the six weeks prior to baseline, the mean per-participant total costs were €1227 (SD=2364) in the intervention group and €1323 (SD=1891) in the control group, indicating that randomisation produced evenly distributed costs across the conditions ($t(234)=0.346$, $p=0.73$).

Safety procedures

As part of the safety procedures, 50 participants were called because they exceeded cutoff scores on suicidal ideation and/or depressive symptoms (31 in control and 19 in intervention group). For 12 of them the GP was called (9 in control and 3 in intervention group). Furthermore, eleven participants reported a suicide attempt, of whom seven were in the control group. No suicides occurred during the study.

Incremental costs

At post-test, the average total annualised per-participant costs were calculated to be €13,303 in the intervention group and €18,343 in the control group. The incremental costs were therefore €13,303 - €18,343 = - €5,039 (rounded to the nearest Euro) per participant per year (equivalent to a cost saving of US\$5,941). Table 3 shows the cost components by condition (control and intervention group) and time (at baseline and posttest). The main difference between the conditions can be observed in costs associated with productivity losses, i.e. costs stemming from absenteeism, presenteeism and domestic help. There was an increase in costs due to absenteeism and domestic work in the control group between baseline and posttest, while these costs decreased in the intervention group.

Table 3. Costs distribution by condition and time

	€, 2009 ^a		
	Baseline	(SD)	Post-test
Care As Usual (N=120)			
Direct medical costs	441.61	(1005.70)	558.70
Medication costs	19.18	(50.60)	21.43
Direct non-medical costs	142.02	(288.11)	175.86
Presenteeism	342.63	(818.06)	278.06
Absenteeism	337.53	(934.96)	392.50
Domestic help	37.77	(135.47)	69.37
Intervention costs	NA		NA
Total costs	1322.98	(1890.93)	1528.56
Online self-help condition (N=116)			
Direct medical costs	459.31	(1541.31)	459.36
Medication costs	37.55	(84.70)	28.04
Direct non-medical costs	145.37	(475.21)	142.11
Presenteeism	276.56	(620.38)	207.22
Absenteeism	288.13	(1168.70)	251.29
Domestic help	19.83	(54.47)	15.52
Intervention costs	NA		148.00
Total costs	1226.77	(2364.29)	1244.203

^a Mean costs on monthly basis (cf. Hakkaart-van Roijen et al. 2010).

Notes: Presenteeism, Absenteeism and Domestic help all relate to production losses. Total costs are the sum of the other cost components. Differences in the totals are due to rounding. NA, not applicable.

Incremental effectiveness

In the intervention group 35.3% (41/116) met criteria for clinically significant change, compared with 20.8% (25/120) in the control group. The difference in effectiveness was therefore $0.353 - 0.208 = 0.15$ (SE 0.06). This difference was evaluated using a linear probability model while taking into account the clustered data structure ($z=2.51$, $p=0.012$, 95% CI 0.03 - 0.26).

Incremental cost-effectiveness

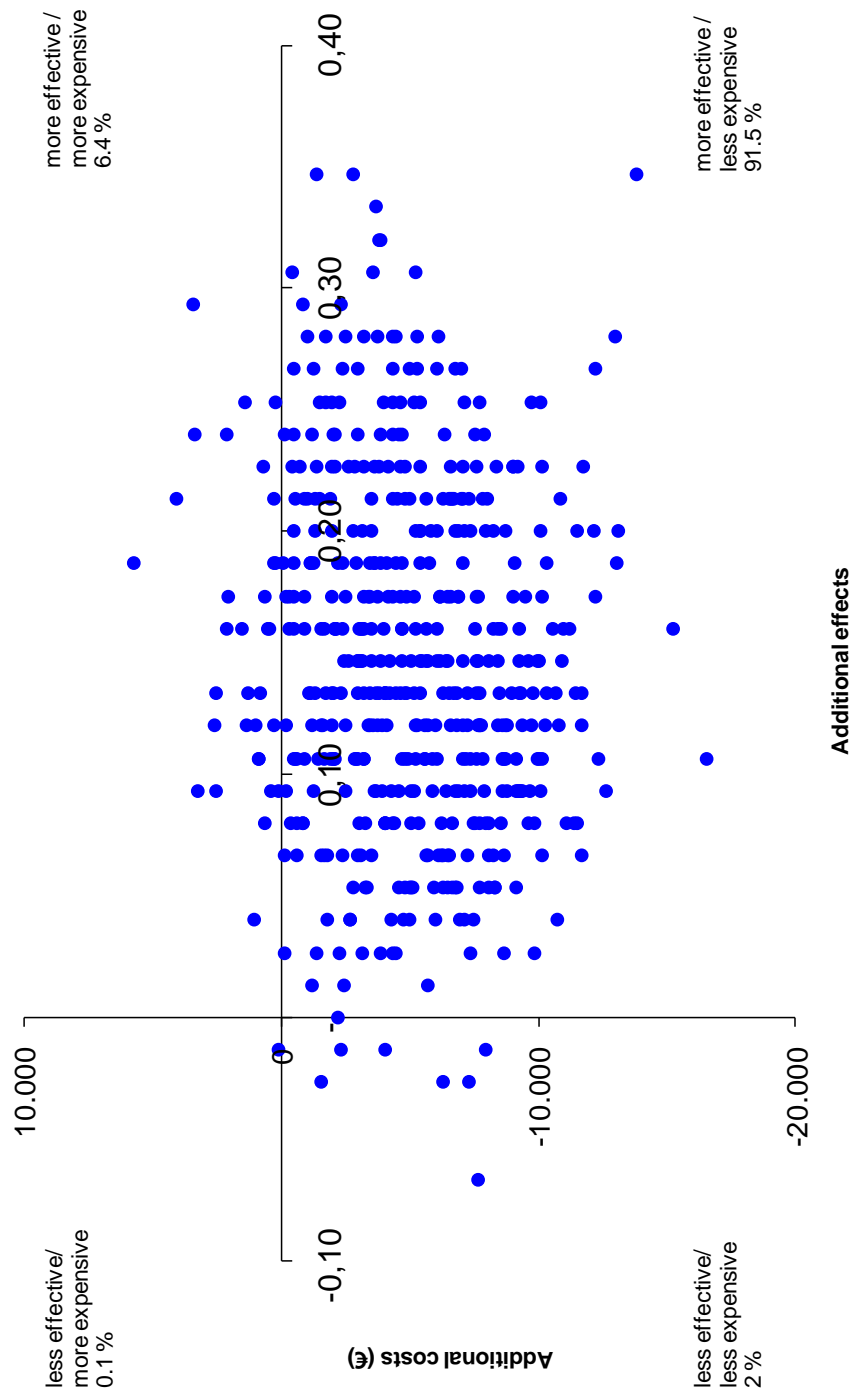
As noted, the incremental costs were - €5,039 (negative costs, hence a cost reduction) and the incremental effect was 0.15. Therefore, the mean incremental cost-effectiveness ratio (ICER) was estimated to be $- €5,039 / 0.15 = - €33,593$ (a saving of US\$39,606) for an additional treatment response. Using the 2,500 bootstraps, the median ICER and its 95% confidence interval could be estimated as - €31,921 (a saving of US\$37,635), essentially conveying the same message.

On the incremental cost-effectiveness plane, each data point represents one simulated ICER. Of these, 91.5% fall into the SE-quadrant, indicating that greater health gains are generated for less cost by the intervention relative to CAU. In addition, 6.4% of the simulated ICERs fall in the NE-quadrant, indicating a probability of 6.4% that by applying the intervention a health gain is produced, but at additional costs. The remainder of the simulated ICERs show up on the west side of the plane, indicating less effectiveness and less cost (2%), or less effectiveness and more cost (0.1%) (see Figure 2).

Acceptability

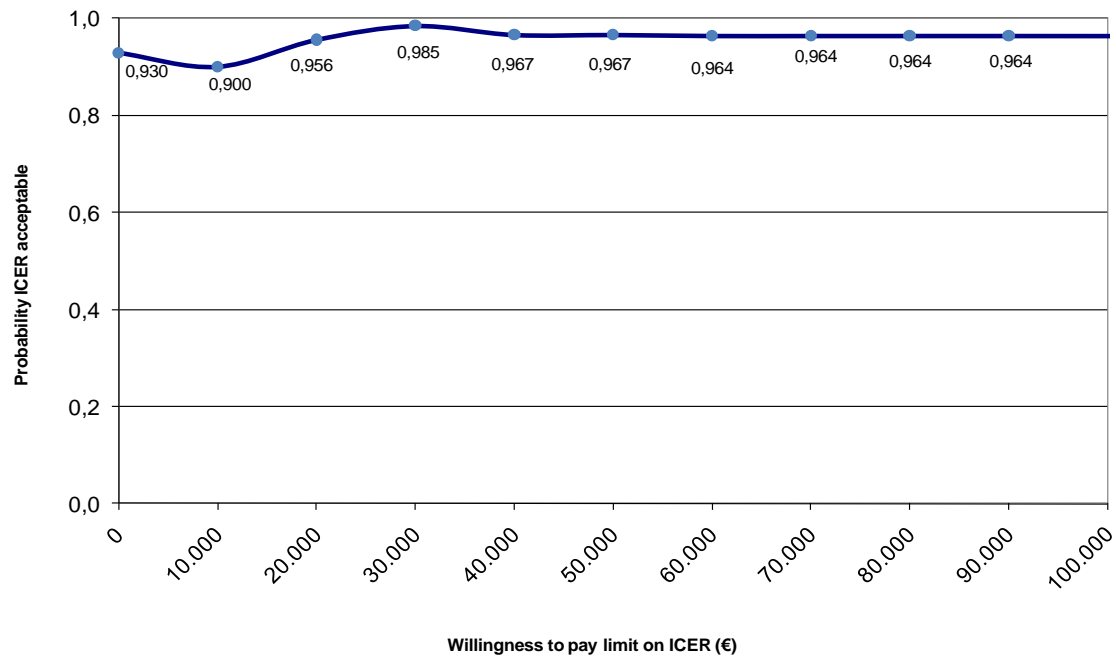
The incremental cost-effectiveness acceptability curve (Figure 3) suggests that with no willingness to pay, there is a 93% probability that the intervention would be regarded as more cost-effective than CAU. When the willingness to pay for a favorable treatment response is €10,000, €20,000, or €30,000 this probability is 90.4%, 95.6% and 98.5%, respectively. The minor variations in probabilities between the WTP

Figure 2. Distribution of bootstrapped ICERs ($n=2,500$) on the cost-effectiveness plane, primary analysis



ceilings imply that the intervention is acceptable from an economic perspective, irrespective of WTP. It can be concluded from this that the intervention can be regarded as acceptable from a cost-effectiveness point of view and that this conclusion is not sensitive to the WTP ceiling used.

Figure 3. Acceptability curve: probability that intervention is acceptable relative to CAU (y-axis) given varying WTP thresholds (x-axis), based on 2,500 bootstrap replications.



Sensitivity analysis

Increasing the intervention costs by adding varying amounts of guidance did not affect the overall conclusion that the intervention produces better health outcomes at lower costs, compared with CAU (Table 4). In the first scenario (scenario A; 1 hour of psychologist support) the median ICER was -€32,342 per treatment responder. The median ICER increased to -€32,708 if the psychologist time was increased by 100%, an ICER which has a 93% probability of falling below the zero willingness to pay threshold (scenario B; 2 hours of support). Similarly the median ICER increased to -€31,647 if the psychologist time was increased to 180 minutes, an ICER which still has a 93% probability of falling below the zero willingness to pay threshold. The outcomes of these sensitivity analyses are presented in Table 4. These increases in ICERs do not affect the overall conclusion. This indicates that the intervention on top of CAU still produces better health at lower costs, compared with CAU alone.

Table 4. Sensitivity analyses: Incremental cost-effectiveness for different scenarios

	Standard self-help intervention	Scenarios		
		A	B	C
Costs, € ^a	-5,039	-4,900	-4,746	-4,592
Effect	0.15	0.15	0.15	0.15
ICER, € (median ^b)	-33,593	-32,342	-32,708	-31,647
Distribution on the cost-effectiveness plane				
1 st quadrant (north-east)	0.06	0.06	0.06	0.08
2 nd quadrant (inferior: north-west)	0.00	0.00	0.00	0.00
3 rd quadrant (south-west)	0.02	0.01	0.02	0.01
4 th quadrant (dominant: south-east)	0.91	0.92	0.90	0.89
WTP ceiling, %				
€0	93	93	93	93
€10,000	90	90	91	88
€20,000	96	95	96	94
€30,000	98	99	99	99

^a Costs per disease-free year at 2009 prices^b Median is 50th percentile of 2,500 bootstrap replication of the ICER.

ICER = Incremental Cost Effectiveness Ratio

WTP = Willingness To Pay

Scenario A = intervention guided by psychologist for 10 minutes per module per participant (i.e. 1 hour in total)

Scenario B = intervention guided by psychologist for 20 minutes per module per participant (i.e. 2 hour in total)

Scenario C = intervention guided by psychologist for 30 minutes per module per participant (i.e. 3 hour in total)

Discussion

Main findings

The aim of this paper was to determine whether online self-help for suicidal thoughts would be cost-effective, using data from the first randomised controlled trial comparing online self-help for suicidal ideation on top of CAU with CAU alone. The proportion of participants that showed clinically significant change in suicidal ideation was significantly higher in the intervention group: 35% compared with 21% in the control group. For each significantly improved participant, €33,593 (US\$39,606) of societal costs were saved relative to CAU in the first year after intervention. The finding that different willingness to pay ceilings only minimally affect cost-effectiveness probability estimates also demonstrates that it is a preferable option from an economic point of view. Sensitivity analyses confirmed the robustness of these findings.

In general, these results add to the observation that web-based interventions can be favorable from an economic perspective for a range of disorders (Tate, et al., 2009). However, as no previous cost-effectiveness analyses have been reported for online self-help for suicidal ideation, the obtained results cannot be directly compared. It may therefore be more appropriate to compare the results with previous cost-effectiveness studies of face-to-face interventions targeting suicidality, although these are also scarce (Leitner, et al., 2008; McDaid & Kennelly, 2009). At best, it can be concluded that obtained results are in line with the finding that MACT is more effective and cheaper in generating a 1% reduction in the proportion of patients with a self-harm episode than CAU (Byford, et al., 2003). As MACT is a brief and manualised treatment, it may be more comparable to self-help than regular face-to-face treatment. Furthermore, a review into therapies for borderline personality disorder (in which suicidality is common) assessed cost-effectiveness in terms of costs per parasuicide event avoided. Although results indicated that DBT could potentially be cost-effective, the mixture of results, high levels of uncertainty and other limitations prevented clear supportive conclusions (Brazier, et al., 2006). Important to

keep in mind regarding the above comparisons, is that the outcomes related to suicidal behaviour, whereas our study was aimed at suicidal ideation.

As comparison with previous cost-effectiveness studies targeting suicidality is limited, our results may also be compared with interventions for depression, a common mental disorder in people with suicidal ideation. In this respect, economic evaluations have shown that guided online self-help for depression has a high probability (91%) of being cost-effective compared to CAU (Warmerdam, et al., 2010). Also, unguided online self-help and therapist-delivered online CBT have been found to be more efficient than CAU (Gerhards, et al., 2010; Hollinghurst, et al., 2010).

Strengths and limitations

The findings reported here should be interpreted with caution. Firstly, due to the relatively short time-horizon of 6 weeks it is unknown how the cost-effectiveness of online self-help is affected after a longer follow-up period. Secondly, data on healthcare consumption and production loss in this study were based on self-report, which may have introduced recall bias. For example, self-report of healthcare uptake may have been underestimated or overestimated, depending upon health resource (van den Brink, van den Hout, Stiggelbout, van de Velde, & Kievit, 2004; Wolinsky, et al., 2007; Zuvekas & Olin, 2009). However, as participants were randomised, such a bias is expected to occur in both groups. Finally, several assumptions and estimates were made when calculating the per-participant intervention costs, in particular the number of people that would engage in online self-help for suicidal ideation and costs related to website maintenance. As these estimates could not entirely be based on actual data, they would need ‘real-world’ verification. Unforeseen variations may therefore arise after implementation.

Strengths of this study pertain to its randomised design, and the large sample size. Furthermore, because healthcare utilisation data was available, it was possible to study the cost-effectiveness of the intervention from a societal perspective.

Implications

From a research perspective, it is evident that this study needs replication to verify results both within and outside the Netherlands. The latter may be challenging in that this would require designing safety procedures that match both general and local ethical and legal considerations, for which no readymade recipe is available. Moreover, this holds true for implementation of the intervention in practice as well.

From a clinical perspective, it is important to keep in mind that suicidal ideation was the primary focus of this study. It was not powered to detect differences at the level of attempted suicide, so it is unknown whether these could be decreased by online self-help. Evidently, the same is true regarding suicide. However, it still seems a remarkable result that suicidal ideation can be reduced in a cost-effective way, especially given that all participants were encouraged to engage in CAU. Moreover, the control group made more use of this than the intervention group, further strengthening the findings. Similarly, the fact that participants in the control group were called more often due to exceeding the cut-off score adds to this.

Conclusion

With respect to psychological interventions targeting suicidality, economic evaluations are practically non-existent. Findings suggest that offering an online intervention on top of CAU increases the likelihood of a favourable outcome. Moreover, these improved clinical outcomes are achieved at lower cost. Furthermore, the conclusion that the online intervention to reduce suicidal ideation is cost-effective is not sensitive to variations in WTP ceilings. Finally, more studies with longer follow-up periods are needed to further substantiate these findings.

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Chapter 9

General Discussion

Introduction

This thesis reported results of the first randomised controlled trial studying online self-help for suicidal thoughts. The main motive for conducting this study was the observation that treatment in its current form does not seem to suit or reach everyone in need. The Internet was chosen as a mode of delivery because of its accessibility, anonymity, and potential reach.

In this final chapter, key findings of this thesis are summarised and discussed. In addition, limitations and strengths related to the study are addressed. Finally, selected issues pertaining to the safety, implementation and dissemination of online self-help for suicidal thoughts are reflected on, and recommendations for future research are formulated.

Key findings

Suicidal thoughts: burden and similarities with worry and rumination

Although prevalence rates for suicidality are generally available, much less was known about the burden of suicidal thoughts and attempted suicide. Chapter two described how disability weights (DWs) for these two health states were estimated. DWs are expressed on a 0-1 scale, with 0 representing full health and 1 representing the worst imaginable health state. As the DWs for suicidal thoughts and mental distress involved in attempted suicide were estimated to be 0.36 and 0.46 respectively, the severity of these health states was clearly illustrated. Remarkably, the DW for mental stress involved in attempted suicide (0.46) was much higher than the DW for physical injury after a suicide attempt (0.09) (Lanting, Toet, & Hoeymans, 2010), implying that the disability of attempted suicide is largely due to mental distress involved in an attempt. In terms of disease burden, it was previously established that completed suicide ranks 21st of all conditions in the Netherlands (Hoeymans & Schoemaker, 2010). When the total burden of attempted suicide is added (consisting of 90,700 disability adjusted life years, of which 45,800 are attributable to mental distress),

attempted suicide with or without fatal outcome rises to the 11th rank of all conditions in terms of disease burden (Hoeymans & Schoemaker, 2010). Suicidal thoughts were not included in the preceding calculation, but would add 166,500 disability adjusted life years (Chapter 2). Overall, these figures clearly justify targeting suicidal thoughts in interventions.

The theoretical reflections on similarities between suicidal thinking and worry and rumination in Chapter Three show that this concept is supported by literature, but that more empirical research is needed to further study this relationship. These apparent similarities also led to the inclusion of therapeutic techniques pertaining to the uncontrollability of thoughts in the intervention studied in this thesis (see Chapter 1). Although the relationship between suicidal thinking and worry was not the primary concern of the RCT conducted in this thesis, the baseline scores on worry were remarkably high and a significant reduction in worry was detected in the intervention group ($d=0.34$) (Chapter 6). Still, more research is needed to further investigate this relationship.

Suicide-related websites

Chapter Four demonstrated what a suicidal individual may encounter when googling for suicide in the Dutch language. In contrast with results from international studies where 9-11% of accessed websites could be classified as ‘prosuicide’, i.e. promoting, facilitating or encouraging suicide (Biddle, Donovan, Hawton, Kapur, & Gunnell, 2008; Recupero, Harms, & Noble, 2008), no Dutch prosuicide websites were encountered. This does not necessarily mean that no Dutch prosuicide websites exist, but shows that they are not easily found. A recent study by Kemp and Collings (2011) confirms this notion, reporting that prosuicide websites are less visible and relatively inaccessible compared to support websites.

Furthermore, it was found that 15% of accessed websites were aimed at prevention, which is at the low end of the range reported in international studies (13-35%) (Biddle, et al., 2008; Recupero, et al., 2008). An evaluation of the quality of accessed prevention websites demonstrated that approximately a quarter met the quality criteria. Of the remaining 85% of suicide related websites, the majority fell in

the ‘news and media’ category (31%), the ‘interactive communication’ category (18%), and the ‘culture’ category (16%). In general, it became clear that the use of e-mental health in Dutch suicide prevention was limited and could be expanded. The remainder of this thesis addressed this by conducting a RCT into online self-help for suicidal thoughts.

Clinical and economic evaluation of online self-help for suicidal thoughts

The clinical evaluation of the intervention in Chapter Six demonstrated that unguided online self-help was effective in reducing suicidal thoughts ($d=0.28$). In addition, significantly greater improvements were detected for hopelessness ($d=0.28$), worry ($d=0.34$), and health status ($d=0.26$) in the intervention group. During the trial, eleven participants reported a suicide attempt, of whom four in the intervention and seven in the control group. No completed suicides occurred during the study.

When selecting participants in the intervention group who had completed at least three modules ($n=65$), between-group effect sizes increased for suicidal thoughts ($d=0.44$), hopelessness ($d=0.48$), and worry ($d=0.43$). Although the difference for health status was no longer significant, small effects arose for anxiety ($d=0.32$) and depressive symptoms ($d=0.34$) (Chapter 6). At first glance, these results point towards a dose-response relationship between adherence and outcome. However, where such associations have been reported in medical studies and Internet interventions for physical problems, the influence of adherence on online therapy outcomes is still unclear (Donkin, et al., 2011). Besides a possible dose-response relationship, factors such as expectations and beliefs, clinical and demographic characteristics, or treatment preferences could play a role.

Compared to studies into online treatment for depression where 50-87% adherence is reported (Andrews, Cuijpers, Craske, McEnvoy, & Titov, 2010; Christensen, Griffiths, & Farrer, 2009), adherence in the current trial was low. Although 56.0% in the intervention group had completed at least three modules at post-test, no more than 21.6% had completed the whole intervention (Chapter 6). At follow-up, the percentage that had completed the whole intervention increased to 31.0%, indicating that some participants needed more than six weeks to complete the

modules (Chapter 7). Inspecting the change in outcomes in the intervention group between post-test and three-month follow-up uncovered that effects were mostly maintained in the intervention group. Within-group effect sizes were 0.04 for suicidal thoughts, 0.12 for hopelessness, and 0.03 for worry and health status. For depressive symptoms, a significant reduction was detected ($d=0.26$), which could indicate a ‘sleeper effect’, i.e. a delayed effect on depressive symptoms. However, as the control group had received access to the intervention at post-test and could consequently not be used in the follow-up as a comparator, no differences between groups could be analyzed.

The cost-effectiveness analyses revealed that even when society is not prepared to pay, there is a large probability (93%) that online self-help is more acceptable from an economic perspective than a waitlist with access to care as usual. The mean incremental cost-effectiveness ratio (ICER) was estimated to be -€33,593, indicating substantial yearly cost savings per additional treatment response. Adding various amounts of guidance in the sensitivity analyses did not alter the conclusion that online self-help on top of care as usual is preferable from an economic perspective. These results fit within the general expectation that web-based interventions can be attractive from an economical point of view (Tate, Finkelstein, Khavjou, & Gustafson, 2009). Comparing results is difficult as the number of previous studies that have economically evaluated treatments for suicidality (online or offline) is scarce (McDaid & Kennelly, 2009). At best, it can be observed that results are in line with the finding that Manual Assisted Cognitive Therapy for self-harm can be cost-effective (Byford, et al., 2003).

Limitations and strengths

The results presented in this thesis should be viewed in light of several limitations of the study. A first limitation relates to the fact that participation in the trial was not anonymous. As this was the first study into the effectiveness of online self-help with a suicidal population, it was considered important to assess possible adverse effects and events. On the other hand, this feature of the study contradicts the rationale for

conducting it in the first place, i.e. providing anonymous help to people who are otherwise reluctant to seek treatment. Indeed, as became apparent from Chapter Six, a substantial part of eligible people declined participation after reading the conditions (i.e. having to provide both their own contact details as well as those of their General Practitioner). Respondents that declined participation generally rated anonymity as important, and less often reported already receiving help. These findings indicate that the original target group, i.e. suicidal people who are reluctant to seek treatment, was not fully represented in the current study sample, which evidently limits generalisability of the results.

As suicidal thoughts were the primary target of the intervention, no conclusions can be drawn regarding the effect of the intervention on attempted suicide or even completed suicide. Although it is an important goal in suicide prevention to interrupt the suicidal process in such a way that attempted and completed suicides can be averted, it is also generally acknowledged that such effects are difficult to capture in intervention research as large sample sizes would be required for sufficient statistical power.

A third limitation is that the control group received access to the intervention at post-test, which made comparison between the groups at follow-up not possible. Although this was decided based on ethical considerations, it would have been desirable to be able to test the differences at follow-up between the groups. In addition, the follow-up period was relatively short (three months), so it is not known whether effects would be retained over a longer period of time.

Main strengths of this study include the randomised controlled design, the sample size, and the low attrition rates. Moreover, this study was the first to evaluate online self-help for suicidal thoughts, thereby demonstrating the feasibility of such an intervention study. In addition, it contributes to the call for more intervention studies in the field of suicidology, as these are still relatively limited (Huisman, Pirkis, & Robinson, 2010). Finally, the included sample showed substantial levels of suicidal thoughts, depressive symptoms, hopelessness, anxiety, and worry, indicating that a severe population was reached.

Reflections on online self-help for suicidal individuals

As online suicide prevention is a young field, and this was the first randomised trial studying online self-help for suicidal thoughts, there are various issues that require reflecting. Acknowledging the range of options for online suicide prevention (e.g. email- and chat-therapy, support forums, screening, and self-tests), topics discussed in the sections below will be limited to issues related to online self-help in suicide prevention.

Safety of participants

Although the anonymity of the Internet has been viewed as a great advantage in this thesis, the inability to control or know what happens on the other side of the screen can also be viewed as irresponsible with respect to a suicidal population. It is therefore no surprise that one of the first issues that comes to mind when considering online treatment with a suicidal population is their safety, especially in light of the anonymity of the web. Experiences with this trial may provide insight into the safety of online self-help in a suicidal population.

Reviewing the (clinical) results presented in Chapter Six, a first important observation is that no suicides occurred during the study. A second relevant finding in this respect is that eleven participants reported having attempted suicide during the study. Although these are undesirable events, in a high-risk population of this sort this is to be expected, and cannot directly be attributed to the intervention. In contrast, as there were fewer attempts in the intervention group ($n=4$), this may even indicate an effect of the intervention on attempted suicide. However, such conclusions cannot be drawn, as this study was not powered to detect differences on this level (see also limitations).

Looking at the results of the participant evaluation (Chapter 7), it appears that a small number of participants (3.2%) indicated that their suicidal thoughts became worse over the course of the study. Some of the reasons reported attributed this to the intervention, which may signify that online self-help is not suitable for everyone

with suicidal thoughts. Experiences with conducting the trial not reported elsewhere in this thesis (e.g. phone calls with participants) confirm this observation, as a small number of participants pointed this out via personal correspondence. Simultaneously, these observations imply that people are capable of concluding whether or not online self-help is the right source of help for them.

In summary, no indications of serious adverse effects for online self-help were detected in this study. Although a small number of suicidal people reported worsening of their suicidal thoughts, this cannot be easily attributed to the intervention. Moreover, along with the lack of adverse effects, the improvement in the majority of participants indicates that the benefits outweigh the risks of online self-help for suicidal thoughts. Still, it is acknowledged that this has been the first trial to study this kind of treatment, which does not allow any definitive conclusions to be drawn. Therefore, care is advised when implementing online self-help for suicidal thoughts (see below).

Implementation

The first issue to consider regarding the implementation of online self-help for suicidal thoughts is that it is not meant as a replacement for professional face-to-face treatment. This should at all times be made clear to potential participants, accompanied by advice to seek additional face-to-face help, which can be facilitated by providing relevant referral information. Several key issues relating to implementation are discussed in this section, such as the provision of guidance, the use of the intervention as a supplement to face-to-face treatment, and eligibility for online self-help in practice.

Concerns related to implementation but not discussed here include the development of strategies to reach the target population. Among commonly reported barriers to seeking help for suicidal people is also a low perceived need for care (Bruffaerts, et al., 2011), which could be addressed by increasing public awareness about the need to seek help when suicidal (Wilson, Deane, Marshall, & Dalley, 2010). Such approaches are beyond the scope of this thesis, but nevertheless important to keep in mind.

Unguided vs. guided

Although this study concerned unguided self-help, it has become clear from this thesis that a number of participants would have preferred some form of guidance (Chapter 7). In general, guidance can be provided by a variety of mental health professionals (e.g. psychologists, psychiatric nurses, counsellors, and trained volunteers) who are knowledgeable about the cognitive techniques utilised in the intervention, as well as about suicidality.

The amount of guidance can be varied in frequency and intensity according to individual needs or available resources. From the results of this thesis, no empirical foundation can be provided for the optimal amount of guidance. However, from an economic perspective, the addition of up to three hours of guidance per participant would not change the cost-effectiveness of the intervention (see Chapter 8). In general, providing guidance can generate larger effects (Andersson & Cuijpers, 2009). Therefore, it may be considered to provide the intervention with some form of guidance when implementing, taking into account available resources.

Stand-alone vs. supplement to face-to-face

In this thesis, the online self-help intervention has mainly been described as a stand-alone program. However, as became apparent from Chapter Six, a over half of the sample (55.5%) was already receiving some form of care upon enrolment. In personal communications not reported elsewhere, a number of participants reported dissatisfaction with face-to-face treatment, including an inability to discuss their suicidality with their care provider. This is not surprising as it has been reported that more than 50% of suicidal people feels their needs are not fully met in treatment (Pirkis, Burgess, Meadows, & Dunt, 2001), and that it is not uncommon to avoid exploring suicidality in treatment (Burgess, Pirkis, Morton, & Croke, 2000). An online program as described in this thesis may facilitate discussing suicidality between patient and care provider and can be of value in providing leads for thoughts and problems underlying the suicidality, which can be further explored in the face-to-face treatment. In this respect, the intervention can be used alongside face-to-face treatment, and participants should be advised and encouraged to inform their care provider about their participation.

Eligibility

As suicidality itself is a transdiagnostic occurrence, i.e. is prevalent in a range of mental disorders (see e.g. Nock, et al., 2008), this intervention was developed and studied accordingly. In keeping with this, no diagnostic instrument was administered during the study. Instead, eligibility for participation in the study was based on severity of suicidality and depressive symptoms, and this section explores each of these criteria with regard to implementation in practice.

Chapter Six showed that relatively few people ($n=15$) were excluded from the trial due to a lack of suicidality indicated on the screening questionnaire. Similarly, a small number of respondents ($n=48$) was excluded due to severe suicidal thoughts. These figures illustrate that the study sample represented a fair share of the suicidal population, and that these criteria could be maintained in practice. In general, it is imperative that potential participants experience a certain level of suicidal thoughts and are motivated to engage in self-help. Conversely, as more severe suicidality is likely to warrant more intensive support than is possible through online self-help, it is recommended to refer these persons to other sources of help (online or offline).

From Chapter Six it also became apparent that severe depressive symptoms were the main reason for exclusion from the trial ($n=468$). This suggests that a substantial number of interested people was too depressed, but not too suicidal to participate. In other words, it seems that a proportion of the target population was excluded, which questions the validity of this criterion. Although this criterion was employed because depression can affect energy and concentration levels, which may influence the ability to participate in self-help, it indicates that broader inclusion criteria regarding depressive symptoms should be explored. Simultaneously, the impact this may have on adherence, for instance, should be examined, as high levels of symptomatology have been associated with intervention drop-out (Christensen, et al., 2009).

A final issue pertaining to eligibility concerns the screening processes involved. For both suicidality and depressive symptoms, numerous questionnaires are available, and it is beyond the scope of this thesis to discuss these and potential cut-off points for exclusion. In addition, it is acknowledged that in spite of screening efforts, the Internet allows people quite easily to circumvent exclusion efforts. It may therefore

be more appropriate to view screening as a consultative process, advising potential participants regarding eligibility, providing clear information as to why it may not be suited to them. They could then be presented with other, more suitable, alternatives for help and support. A similar screening/consultative approach was adopted during the study.

Implementation in practice: 113Online

Following completion of the trial, the intervention was implemented in collaboration with 113Online, a Dutch online suicide prevention platform providing a range of services to suicidal people and their loved ones, as well as to people bereaved by suicide and professionals treating suicidality. By means of a telephone helpline and online crisis chat service, 113Online provides accessible and anonymous care to people in an emotional crisis. Other services include online psychotherapy, a moderated peer-to-peer forum, and self-tests. Since April 2011, 'Leven Onder Controle', the intervention studied in this thesis, has become part of their services and can be participated in anonymously.

Within 113Online, several psychologists are available to provide guidance. Currently, participants can indicate whether they would like personal guidance in the form of three e-mails with a psychologist upon registration. These three e-mails are a guideline, but could be increased according to individual needs. Embedding the intervention in an integrated online suicide prevention platform also has the advantage that people can be referred to a more intensive form of support when needed, such as online psychotherapy, or to more immediate form of support, such as the telephone and crisis chat service.

Dissemination

Online self-help as studied in this thesis is widely distributable. As the Internet is not subject to geographical barriers, this intervention can now be used by Dutch individuals all over the world. In addition, first steps have been taken to spread the intervention to other language areas. In collaboration with the Centre for Mental

Health Research of the Australian National University, it has been translated into English, and preparations for a trial are underway.

In general, online self-help also has potential in regions where mental health care is less accessible or available. Where an estimated 44% of suicidal people in high income countries do not receive treatment, this increases to 72% and 83% for middle and low income countries respectively (Bruffaerts, et al., 2011). Also judging from the cost-effectiveness analyses in Chapter Eight, online self-help could be an attractive option in developing regions. Evidently, the intervention should be adapted to relevant cultural norms and values, and subsequently studied in these contexts.

Future research and development

As the trial described in this thesis was the first to study online self-help for suicidality, there evidently is a need to replicate the trial. In addition, it should be ascertained whether positive outcomes of this trial generalise into daily practice (see e.g. Riper, et al., 2009).

As became clear from this discussion, potential future research interests include the relationship between suicidal thinking, worry, and rumination, the effect of online self-help on attempted and completed suicide, the provision of guidance (e.g. optimal form and amount, effect on outcomes, and effect on adherence), adherence (e.g. influence on outcomes and predictors of adherence), and the use of online self-help as a supplement to face-to-face treatment.

In addition, research areas into suicide-related online activities and behaviours can inform us on which individuals at risk for suicide go online, why they go online, and what they look for. However, as noted in one of the few studies conducted in this area, there are a number of obstacles involved, including “*sample representation, appropriate reference groups, determining response rates, and privacy concerns*” (Harris, McLean, & Sheffield, 2009, p. 264). Furthermore, it would be recommended to gain knowledge on who benefits from online self-help for suicidal thoughts, e.g. by identifying predictors and moderators of treatment outcome.

Alongside potential future research topics, indications for further development of the intervention have been identified in this trial. For example, participants

indicated a need for a more tailored intervention (Chapter 7). Tailoring might entail screening participants for ‘most urgent problem areas’ (e.g. controlling emotions, repetitive thinking, hopelessness, worthlessness, feelings of guilt, unlovability) and preferred therapeutic techniques (e.g. seeking distraction, mindfulness, cognitive restructuring, positive thinking, problem solving) upon registration. Depending on the outcome, participants might be directed to the most relevant module. After completion, the screening process could be repeated until all relevant modules have been completed. Future research is required to inform the screening and direction process, as well as the effectiveness of such a tailored intervention. In line with this, the intervention could be tailored to specific populations, such as adolescents and cultural minorities. Another area to explore would be the use of mobile phone applications in suicide prevention. These could be deployed as support for a web-based intervention, or may be developed as a stand-alone treatment program.

Conclusion

The results of this thesis demonstrate that online self-help can be effective in reducing suicidal thoughts, suggesting it being an commendable intervention for those who are reluctant to seek regular treatment or feel their needs regarding their suicidality are not fully met in treatment. Also from an economic perspective, online self-help for suicidal thoughts proves to be an attractive option. In general, future studies are needed to replicate these findings and provide more insight into the effectiveness of online suicide prevention.

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Summary

Suicidal people often do not receive adequate treatment. A recent worldwide survey estimated that 44% of people with suicidal thoughts in high-income countries do not receive treatment. In middle- and low income countries the percentage of untreated suicidal people is even higher (72% and 83% respectively). Arising from the observation that treatment in its current form does not seem to suit or reach everyone in need, this thesis presents a new alternative to suicide prevention using the Internet as a mode of delivery. Specifically, an online self-help intervention aimed at reducing suicidal thoughts was developed and studied in a randomised controlled trial. The central aims of this thesis are to investigate the clinical effectiveness, acceptability, and cost-effectiveness of this intervention. The secondary aim of this thesis is to estimate disability weights for suicidal thoughts and mental distress involved in attempted suicide (**Chapter 1**).

Chapter Two demonstrates the severity of the problem targeted by the intervention, i.e. suicidal thoughts, in terms of disease burden. By estimating Disability Weights (DWs), the severity of a health state can be expressed on a 0-1 scale, with 0 representing full health and 1 representing the worst imaginable health state. Using an expert panel, DWs for suicidal thoughts and mental distress involved in attempted suicide were estimated in this chapter. For suicidal thoughts, a DW of 0.36 was generated, indicating that suicidal thoughts are as disabling as alcohol and cocaine dependence, severe asthma, and moderate heart failure. Mental distress involved in attempted suicide was comparable in severity to heroin dependence and initial stage Parkinson, expressed in an estimated DW of 0.46. When using these DWs to (provisionally) calculate Disability Adjusted Life Years (DALYs), a frequently used indicator of disease burden, an estimated 166,500 healthy life years are lost on an annual basis in the Netherlands due to suicidal thoughts. For mental distress involved in attempted suicide, this would be 45,800.

Suicidal people are often tormented by ruminative, repetitive thoughts such as *'Nobody loves me'* and *'I am a complete failure'*. In **Chapter Three**, the similarities between suicidal thinking and worry and rumination are explored. Although empirical evidence is scarce and future research is needed to further investigate their relationship, this chapter concludes that characteristics of suicidal thinking can be usefully

conceptualised as characteristics of worry or rumination, and that this conceptualisation can provide leads for treatment.

In **Chapter Four**, an inventory of Dutch suicide-related websites is compiled. Entering four different Dutch search terms in Google ('suicide', 'zelfdoding', 'zelfmoord', and 'ik wil dood'), the first 50 results of each search were categorised. The majority of the 153 accessed websites fell within the 'news and media' category (31%). Next, the categories 'interactive communication' (18%), 'culture' (16%), and 'other organisations' (15%) had the largest share. A similar percentage was aimed at suicide prevention (15%). These prevention-websites were further assessed using 17 quality features, revealing that Dutch online suicide prevention is not yet optimal. In particular, improvement is recommended in the field of e-help.

Chapter Five describes the design of a randomised controlled trial (RCT) comparing online unguided self-help for suicidal thoughts with a waitlist control group. For this trial, participants were recruited from the general population through advertisements in newspapers and on relevant websites. Eligibility was based on levels of suicidal thoughts and depressive symptoms. Ineligible respondents, i.e. respondents who were too suicidal or depressed to participate in online self-help, were provided with relevant referral information. In total, 236 respondents were randomised into the intervention (n=116) and control (n=120) condition. The intervention group received access to the intervention website, while the control group was provided with general information on suicidality and referrals to other organisations. Both groups were also advised to seek additional help (e.g. via the General Practitioner). Measurements took place at baseline, 2 and 4 weeks into the intervention, and 6 weeks after baseline (post-test). At post-test, the control group also received access to the intervention website. Three months after post-test, a follow-up assessment was administered to both groups to see whether effects detected at post-test in the intervention group were maintained.

In Chapters Six to Eight, results of the RCT are presented. First, **Chapter Six** deals with the clinical effectiveness of the intervention. For suicidal thoughts, an effect size of 0.28 was detected in favour of online unguided self-help. In addition, significantly greater improvements were detected for hopelessness (d=0.28), worry (d=0.34), and health status (d=0.26) in the intervention group. When selecting

participants in the intervention group who had completed at least three modules ($n=65$), between-group effect sizes increased for suicidal thoughts ($d=0.44$), hopelessness ($d=0.48$), and worry ($d=0.43$). Although the difference for health status was no longer significant, small effects arose for anxiety ($d=0.32$) and depressive symptoms ($d=0.34$). During the trial, eleven participants reported a suicide attempt, of whom four in the intervention and seven in the control group. No completed suicides occurred during the study.

Chapter Seven addresses the question whether results detected at post-test in the intervention group can be maintained up to three months. Results of the intervention group show that effects were generally maintained at follow-up, as illustrated by within-group effect sizes (obtained between post-test and follow-up) of 0.04 for suicidal thoughts, 0.12 for hopelessness, and 0.03 for worry and health status. For depressive symptoms, a significant further reduction was detected ($d=0.26$). As the control group had received access to the intervention at post-test, this group could not be used in the follow-up as a comparator. Chapter Seven also contained results of a participant evaluation, which showed that the majority of the sample reported that their suicidal thoughts trouble them less over the course of the study. Also, the majority indicated to be satisfied with the intervention. Suggestions for improvement included the addition of guidance, and tailoring the intervention to individual needs.

In **Chapter Eight**, it is concluded that online self-help for suicidal thoughts is cost-effective. The mean incremental cost-effectiveness ratio (ICER) was estimated to be –€33,593, indicating cost savings per additional treatment response. Even when society is not prepared to pay for one additional treatment responder, the probability that online self-help on top of care as usual is more acceptable than waitlisted care as usual alone is 93.0%. Sensitivity analyses showed that providing 1, 2 or 3 hours of guidance per participant during the whole intervention would not alter the conclusion that online self-help is preferable from an economic perspective.

Finally, **Chapter Nine** summarises and discusses main findings. Main conclusion is that online self-help can be effective in reducing suicidal thoughts, suggesting it being a commendable alternative for those who are reluctant to seek regular treatment or feel their needs regarding their suicidality are not fully met in

treatment. Also from an economic perspective, online self-help for suicidal thoughts proves to be an attractive option. In general, future studies are needed to replicate findings and provide more insight into the effectiveness of online suicide prevention. In addition, limitations and strengths of the study are outlined and various issues relating to online self-help for suicidal thoughts are reflected upon, such as safety of participants, implementation and dissemination. Finally, suggestions for future research and developments are formulated.

Samenvatting

Mensen met suïcidale gedachten krijgen vaak geen adequate behandeling. Een recent wereldwijd onderzoek toonde aan dat ongeveer 44% van de suïcidale mensen in landen met een relatief hoog inkomen hier geen behandeling voor krijgt. In landen met een gemiddeld en een relatief laag inkomen ligt dit percentage nog hoger (respectievelijk 72% en 83%). Veel mensen die kampen met suïcidaliteit zoeken zelf ook geen behandeling, bijvoorbeeld vanwege schaamte, vanwege de wens zelf de problemen op te lossen, of omdat ze geen vertrouwen hebben in de hulpverlening. Om een laagdrempelige vorm van suicidepreventie te ontwikkelen wordt er in deze dissertatie een nieuwe manier van suicidepreventie gepresenteerd die gebruikt maakt van het Internet. Het gaat hierbij om een online zelf-hulp interventie gericht op het verminderen van suïcidale gedachten. Deze interventie wordt onderzocht op werkzaamheid door middel van een gerandomiseerd onderzoek. Centraal stonden de klinische effectiviteit en de kosten effectiviteit. Secundair doel van deze dissertatie was het schatten van de psychische ziektelast van suïcidaliteit (**Hoofdstuk 1**).

Hoofdstuk Twee beschrijft de ernst van suïcidale gedachten in termen van ziektelast. Door het schatten van ziektelastgewichten kan de ernst van een ziekte of conditie worden uitgedrukt op een schaal lopend van 0 tot 1. Nul staat hierbij voor de best denkbare gezondheidstoestand, en één voor de slechtst denkbare gezondheidstoestand. Met behulp van een expert panel werden ziektelastgewichten geschat voor suïcidale gedachten en voor het psychische leed dat gepaard gaat met suïcide pogingen. Voor suïcidale gedachten werd een gemiddelde wegingsfactor van 0.36 gevonden, wat overeenkomt met de wegingsfactoren van alcohol en drugs afhankelijkheid, zware astma en matige hartdecompensatie. Psychisch leed dat gepaard gaat met een suïcidepoging was, uitgedrukt in een gemiddelde wegingsfactor van 0.46, vergelijkbaar met heroïne afhankelijkheid en de beginfase van de ziekte van Parkinson. Uitgedrukt in Disability Adjusted Life Years (DALYs), een veel gebruikte maat voor ziektelast, blijkt dat er jaarlijks 166.500 gezonde levensjaren verloren gaan door suïcidale gedachten. Voor het psychisch leed dat gepaard gaat met een suïcidepoging is dit aantal 45.800.

Mensen met suïcidale gedachten worden vaak geteisterd door ruminerende, repetitieve gedachten zoals *‘Niemand houdt van mij’* en *‘Ik ben een complete mislukking’*. In **Hoofdstuk Drie** worden de overeenkomsten tussen het denken aan suïcide en

piekeren beschreven en geconcludeerd dat bepaalde kenmerken van het denken aan suïcide geconceptualiseerd kunnen worden als piekeren. Dit kan een uitgangspunt bieden voor behandeling. Empirisch bewijs voor de werkzaamheid van een piekeraanpak bij suïcidaliteit is echter nog schaars en toekomstig onderzoek is nodig om dit verder te onderzoeken.

In **Hoofdstuk Vier** wordt een overzicht gepresenteerd van Nederlandstalige websites die over suïcide gaan. Hiervoor werden vier verschillende zoekopdrachten uitgevoerd met Google met de trefwoorden ‘suïcide’, ‘zelfdoding’, ‘zelfmoord’ en ‘ik wil dood’. Van de zoek resultaten werden steeds de eerste 50 treffers bekeken en gecategoriseerd. De meerderheid van de 153 bekeken websites viel in de categorie ‘nieuws en media’ (31%). Ongeveer 15% viel in de categorie ‘suïcidepreventie’ (15%). De websites in deze categorie werden nader onderzocht aan de hand van 17 kwaliteitscriteria. Hieruit bleek dat Nederlandstalige online suïcidepreventie nog niet optimaal is. Met name op het gebied van e-hulp is ruimte voor verbetering.

Hoofdstuk Vijf beschrijft de opzet van een gerandomiseerd onderzoek dat tot doel heeft een onbegeleide online zelfhulpcursus voor mensen met suïcidale gedachten te vergelijken met een wachtlijst controle groep. Deelnemers voor dit onderzoek werden geworven in de algemene bevolking door middel van advertenties in kranten en op relevante websites. Geschiktheid om deel te nemen werd bepaald op basis van de ernst van de suïcidale gedachten en depressieve symptomen. Respondenten die niet in aanmerking kwamen voor deelname werden doorverwezen naar andere hulpbronnen. In totaal werden 236 deelnemers op basis van toeval ingedeeld in de interventie groep (n=116) en de controle groep (n=120). De interventie groep kreeg direct toegang tot de interventie website, terwijl de controle groep hier 6 weken op moest wachten. In de tussentijd kreeg zij toegang tot een website met algemene informatie over suïcidaliteit en met verwijzingen naar andere hulpbronnen. Beide groepen kregen ook het advies om aanvullende hulp te zoeken (bijvoorbeeld via de huisarts). Om de werkzaamheid van de interventie te onderzoeken werden suïcidale gedachten en andere variabelen op verschillende tijdstippen gemeten: de voormeting, 2 en 4 weken na de voormeting, en de nameting (6 weken na de voormeting). Drie maanden na de nameting vond er een follow-up meting plaats om te kunnen bepalen of eventuele effecten behouden bleven.

De hoofdstukken zes tot en met acht bevatten de resultaten van het gerandomiseerde onderzoek. Ten eerste wordt in **Hoofdstuk Zes** de klinische effectiviteit beschreven. Voor suïcidale gedachten werd een effectgrootte van 0.28 gevonden in het voordeel van de interventie groep. Daarnaast werden er ten opzichte van de controle groep in de interventie groep significante verbeteringen gedetecteerd voor hopeloosheid ($d=0.28$), piekeren ($d=0.34$) en gezondheidstoestand ($d=0.26$). Deelnemers in de interventie groep die tenminste drie modules hadden afgerond ($n=65$), lieten de meeste verbetering zien ten opzichte van de controle groep met effectgroottes van 0.44 suïcidale gedachten, 0.48 voor hopeloosheid en 0.43 voor piekeren. Deze groep bleek ook significant te verbeteren in angst ($d=0.32$) en depressie ($d=0.34$). Tijdens het onderzoek hebben 11 deelnemers een suïcide poging gedaan (gebaseerd op zelfrapportage), waarvan er 4 in de interventie groep zaten en 7 in de controle groep. Voor zover bekend zijn er geen suïcides geweest.

Hoofdstuk Zeven gaat in op de vraag of verbeteringen binnen de interventie groep behouden bleven tussen de nameting en de follow-up meting. Dit bleek het geval voor suïcidale gedachten, hopeloosheid, piekeren en gezondheidstoestand. Depressieve symptomen bleken significant te zijn verminderd tussen de nameting en de follow-up meting ($d=0.26$). Omdat de controle groep op de nameting toegang had gekregen tot de interventie website kon deze niet meer als vergelijkingsgroep dienen op de follow-up meting. Hoofdstuk Zeven beschrijft ook de resultaten van de evaluatie van de interventie. Hieruit bleek dat de meerderheid van de deelnemers minder last had van hun suïcidale gedachten aan het eind van het onderzoek. Daarnaast zei een meerderheid tevreden te zijn met de interventie. Suggesties voor verbeteringen betroffen onder andere het aanbieden van begeleiding, en het aanpassen van de interventie aan individuele behoeften.

In **Hoofdstuk Acht** wordt geconcludeerd dat online zelfhulp voor suïcidale gedachten kosten effectief is. De gemiddelde ‘incremental cost-effectiveness ratio’ (ICER) werd geschat op - €33.593, wat wijst op een aanzienlijke kostenbesparing per klinisch significant verbeterde persoon. Sensitiviteits analyses toonden aan dat het aanbieden van 1, 2 of 3 uur begeleiding per deelnemer gedurende de interventie geen invloed heeft op de conclusie dat online zelfhulp de voorkeur heeft vanuit een economisch perspectief.

Tenslotte worden in **Hoofdstuk Negen** de bevindingen van deze dissertatie samengevat en besproken. Belangrijkste conclusie is dat online zelfhulp effectief kan zijn in het verminderen van suïcidale gedachten, wat suggereert dat het een aanbevelingswaardig alternatief is voor mensen die terughoudend zijn in het zoeken van reguliere behandeling of die het gevoel hebben dat hun behoeften betreffende hun suïcidaliteit niet volledig worden bevredigd tijdens hun behandeling. Ook vanuit economisch perspectief blijkt online zelfhulp voor suïcidale gedachten een aantrekkelijke optie. In dit laatste hoofdstuk worden tevens beperkingen en sterke punten van het onderzoek besproken, en wordt er gereflecteerd op verschillende zaken die met online suïcidepreventie te maken hebben zoals veiligheid van deelnemers, implementatie en verspreiding. Zo kan een dergelijke interventie bijvoorbeeld interessant zijn voor landen met minder GGZ voorzieningen of minder economische middelen. Tenslotte worden ook suggesties gedaan voor toekomstige onderzoeken en ontwikkelingen.

Dankwoord

Graag wil ik van de gelegenheid gebruik maken om iedereen te bedanken die heeft bijgedragen aan het tot stand komen van dit proefschrift.

Om te beginnen mijn promotor, professor Ad Kerkhof. Ad, ik heb altijd met veel bewondering geluisterd naar jouw visie op en inzicht in suïcidaliteit, zowel vanuit klinisch als wetenschappelijk perspectief. Jouw ervaring en enthousiasme waren onmisbaar voor dit project, en hebben sterk bijgedragen aan mijn ontwikkeling als onderzoeker.

Mijn co-promotor, dr. Annemieke van Straten. Annemieke, jouw input tijdens het opzetten en uitvoeren van het onderzoek en het schrijven van artikelen waren van onschatbare waarde voor mij.

Alle deelnemers aan mijn onderzoek. Ik heb bewondering voor jullie moed om mee te doen aan dit onderzoek in een kwetsbare tijd. Zonder jullie was dit project niet geslaagd en hadden we de interventie niet kunnen implementeren in de praktijk.

Het expert panel voor hun bijdrage aan de ontwikkeling van de interventie en het design van het onderzoek: prof.dr. G. Andersson, prof.dr. A.T.F. Beekman, prof.dr. M. van der Gaag, prof.dr. C. van Heeringen, prof.dr. I.Marks, prof.dr. M.J.M. van Son en prof.dr. S. Visser.

De leescommissie: prof.dr. G. Andersson, prof.dr. A.T.F. Beekman, prof.dr. C. van Heeringen, prof.dr. A.M. van Hemert, prof.dr. H. Riper en prof.dr. M.J.M. van Son. Dank voor de tijd die jullie hebben besteed aan het kritisch lezen van mijn proefschrift.

Mijn overige medeauteurs: Wouter van Ballegooijen, Nancy Hoeymans, Cristina Majó en Filip Smit. Het was een genoegen met jullie te schrijven. Filip, speciale dank voor je geduldige en heldere uitleg van ingewikkelde zaken.

Ook wil ik alle medewerkers van de afdeling Klinische Psychologie bedanken. Specifiek Pim Cuijpers, ik heb genoten van mijn tijd op de afdeling en ben je erg dankbaar voor de kansen die ik heb gekregen. Mijn kamergenoten: Ellen, Judith, Derek en Marieke, het was altijd bijzonder gezellig met jullie. En ook Carmen, voor de hulp bij de dataverzameling.

Alle medewerkers en vrijwilligers van Stichting Ex6, met name de bestuursleden: Marie José, Tjibbe, Ed, Jeannette, Suzanne en Theo. Ik ging altijd met veel plezier naar Den Bosch voor de maandelijkse bestuursvergaderingen.

Alle medewerkers van Stichting 113Online. Ik ben trots dat de interventie via 113 beschikbaar is voor de doelgroep. Met name Jan, Lucy en Anouk: bedankt voor alle steun, hulp bij de dataverzameling en de prettige samenwerking.

All staff at CMHR: thanks for the lovely time at the centre during my working visit. Especially Helen and Fiona: thanks for putting me in room 15 ☺.

Mijn paranimfen: Annemiek en Kim. Kim, jij stond altijd voor me klaar met lieve woorden en een heerlijke maaltijd. Ik had je vriendschap en kookkunsten niet willen missen de afgelopen 17 jaar! Veel succes en plezier bij je eigen promotie traject. Annemiek, wat ben ik blij dat je mijn collega was. Je hebt me altijd briljant geholpen, bijvoorbeeld met de dataverzameling als ik in het buitenland was en met het maken van casussen. We hebben heel wat meegemaakt en ik waardeer je vriendschap en grenzeloze bemoeizucht enorm.

En natuurlijk de rest van mijn lieve vrienden, met name Marieke, Charlotte en de ‘harde kern’: Floor, Gerrie, Erik en Welmoed. Dank voor alle gezellige avonden.

Mijn familie, in het bijzonder mijn moeders en broer: jullie hebben mij altijd gesteund en een plek gegeven om tot rust te komen.

Finally of course John. I never imagined that my working visit to Canberra would result in me moving to that side of the world. You’ve been awesome in helping me finish this thesis in every way; I really admire your way of thinking, and I’m proud to have you by my side. <3